PROCESS AUTOMATION

Freelance 2019

Engineering Manual
Operator Station Configuration

PROCESS AUTOMATION

Freelance 2019

Engineering Manual
Operator Station Configuration

Document Number: 3BDD012518-111
Revision: A
Release: January 2019

Notice

This document contains information about one or more ABB products and may include a description of or a reference to one or more standards that may be generally relevant to the ABB products. The presence of any such description of a standard or reference to a standard is not a representation that all of the ABB products referenced in this document support all of the features of the described or referenced standard. In order to determine the specific features supported by a particular ABB product, the reader should consult the product specifications for the particular ABB product.

ABB may have one or more patents or pending patent applications protecting the intellectual property in the ABB products described in this document.

The information in this document is subject to change without notice and should not be construed as a commitment by ABB. ABB assumes no responsibility for any errors that may appear in this document.

Products described or referenced in this document are designed to be connected, and to communicate information and data via a secure network. It is the sole responsibility of the system/product owner to provide and continuously ensure a secure connection between the product and the system network and/or any other networks that may be connected.

The system/product owners must establish and maintain appropriate measures, including, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, and so on, to protect the system, its products and networks, against security breaches, unauthorized access, interference, intrusion, leakage, and/or theft of data or information.

ABB verifies the function of released products and updates. However system/product owners are ultimately responsible to ensure that any system update (including but not limited to code changes, configuration file changes, third-party software updates or patches, hardware change out, and so on) is compatible with the security measures implemented. The system/product owners must verify that the system and associated products function as expected in the environment they are deployed.

In no event shall ABB be liable for direct, indirect, special, incidental or consequential damages of any nature or kind arising from the use of this document, nor shall ABB be liable for incidental or consequential damages arising from use of any software or hardware described in this document.

This document and parts thereof must not be reproduced or copied without written permission from ABB, and the contents thereof must not be imparted to a third party nor used for any unauthorized purpose.

The software or hardware described in this document is furnished under a license and may be used, copied, or disclosed only in accordance with the terms of such license. This product meets the requirements specified in EMC Directive 2014/30/EU and in Low Voltage Directive 2014/35/EU.

Trademarks

All rights to copyrights, registered trademarks, and trademarks reside with their respective owners.

Table of contents

2 - Standard displays

3 - Graphic display

4 - Logs

Index

About this book

Use of warning, caution, information, and tip icons

This publication includes **Warning**, **Caution**, and **Information** where appropriate to point out safety related or other important information. It also includes **Tip** to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:

Electrical warning icon indicates the presence of a hazard which could result in *electrical shock.*

Warning icon indicates the presence of a hazard which could result in *personal injury.*

Caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in *corruption of software or damage to equipment/property.*

Information icon alerts the reader to pertinent facts and conditions.

Tip icon indicates advice on, for example, how to design your project or how to use a certain function

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all **Warning** and **Caution** notices.

Terminology

The Glossary contains terms and abbreviations that are unique to ABB or have a usage or definition that is different from standard industry usage. Please make yourself familiar to that.

You will find the glossary at the end of the ***Engineering Manual System Configuration.***

Document conventions

The following conventions are used for the presentation of material:

- The words in names of screen elements (for example, the title in the title bar of a window, the label for a field of a dialog box) are initially capitalized.
- Capital letters are used for the name of a keyboard key if it is labeled on the keyboard. For example, press the ENTER key.
- Lowercase letters are used for the name of a keyboard key that is not labeled on the keyboard. For example, the **space bar**, **comma key**, and so on.
- Press CTRL+C indicates that you must hold down the CTRL key while pressing the C key (to copy a selected object in this case).
- Press **ESC, E, C** indicates that you press and release each key in sequence (to copy a selected object in this case).
- The names of push and toggle buttons are boldfaced. For example, click **OK**.
- The names of menus and menu items are boldfaced. For example, the **File** menu.
  - The following convention is used for menu operations: MenuName > MenuItem > CascadedMenuItem. For example: select **File** > **New** > **Type**.
  - The **Start** menu name always refers to the **Start** menu on the Windows Task Bar.

- System prompts/messages are shown in the Courier font, and user responses/input are in the boldfaced Courier font. For example, if you enter a value out of range, the following message is displayed:

  ```
  Entered value is not valid. The value must be 0 to 30.
  ```

  You may be told to enter the string TIC132 in a field. The string is shown as follows in the procedure:

  TIC132

  Variables are shown using lowercase letters.

  sequence name

1 Messages and hints

1.1 General description - Messages and hints

The task of message processing in Freelance Engineering is to configure the method of processing and displaying messages in Freelance Operations on the Operator Station.

Messages are used by the process stations in the Freelance system to notify the operator stations of changes in the process operation. Such changes may be faults or states in the process or also error functions of the Freelance system itself.

The Freelance system makes available the message types **system message, fault message, switch message, hint** and **hint message**. These types of message can be classified into different priority levels, one system level (divided into three groups, S1 - S3) and five user levels (1 - 5). The individual priority levels are displayed in different colors.

Different acknowledgment strategies can be allocated to these priority levels. Acknowledgment strategy here means how the operator at the control stations is to acknowledge the messages which arrive. The acknowledgment strategy to be used for each priority can also be configured.

Configuration is divided into **global** and **local message processing**.

Global message processing comprises configuration of the acknowledgment strategies of messages in the Freelance system as a whole.

Local message processing comprises configuration of the station-specific settings for **message list**, **message line**, **hint list**, and **horn activation**. It has to be done for each Operator station separately.

1.1.1 Display of the message line during operation

The message line is always visible in Freelance Operations. Thus the operator at the Operator station can immediately ascertain incorrect behavior in the process and take appropriate action.

The message line contains fields for the display of messages and buttons for selecting items on the hint list and for acknowledging the control room horn.

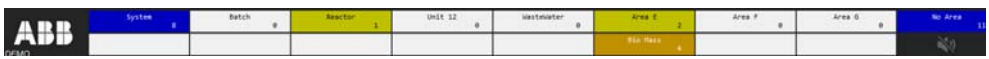
It can be displayed in three different views:

Standard view of the message line


Standard View.png

Several message points with tag names and message point information.

Area view of the message line


Area view.png

Each plant area has its own place in the message line. For each plant area the number of the associated messages present is displayed; the plant area is displayed in the priority color of the most important message; the most important message is shown in the tooltip. When you select a specific plant area button a message list specific to the plant area will be opened.

List view of the message line


List View.png

The 4 most important messages are displayed in the same format as the on the message page. When you double-click on the message, the faceplate that belongs to the message will be opened.

Depending on the selected view the message list may contain a button for point acknowledging or visually acknowledging messages in the message line, a field for displaying an overflow of the message line and the number of all messages contained in the message list.

Depending on the configuration of the type of acknowledgment, the display of the message line changes:

For **visual acknowledgment**  is indicated. For **point acknowledgment**  is indicated.

This button is active and marked with an **i** if messages arrive for which hints have been configured. This also applies to the arrival of special hint messages. The hint list can then be displayed.

If there are no hints the **i** is not displayed.

Message fields

On these fields the arriving messages are displayed. The display in the message field contains two lines.

This field is designated the overflow field. The area has a yellow background if there are more messages than can be displayed in the message line.

The number below this indicates the total number of messages.

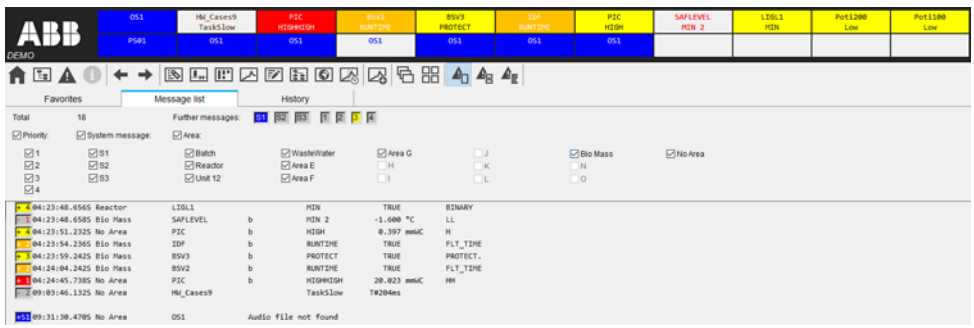
The displayed messages are acknowledged. This is a **visual acknowledgment** only; The number of messages is not affected by this.

The displayed messages are **point acknowledged**. The number of messages is updated if necessary.


This field is used to acknowledge the control room horn. It turns colored as soon as the control room horn has been activated.

When a message is selected in the message line, the appropriate faceplate is called up for operation.

1.1.2 Components of the message list



MessageList.png

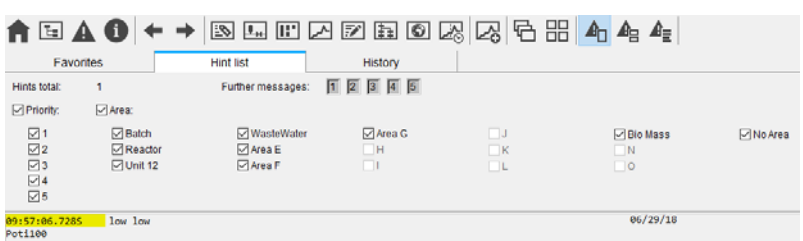
The **message list** consists of a **header**, the **list with** the current **messages**, and the **operating element area** with four buttons and three checkboxes.

In the **header**, the total number of messages is indicated. On the right hand side, colored boxes indicate if any messages exist outside the currently displayed page. If a box is highlighted with its priority color, messages of that priority are not visible on the screen. Various checkboxes are available to filter the messages. If you select a checkbox, the associated messages will be shown.

In the **Message List** the fault and switch messages can be displayed in different formats. The formats differ in the type of information presented to the operator. For system messages only a fixed display format is available.

In the **operating element area** messages can be acknowledged, the sound file configured for a message can be played back and the display format can be selected.

1.1.3 Components of the hint list



HintList.png

The components of the **hint list** are identical to those of the message list. The messages displayed are hints and/or hint messages only.

The operation of the hint list also corresponds to the operation of the **message list**. The only differences relate to the filtering of messages and **hint list** is only visual acknowledge is possible.

1.2 Message types

In the Freelance system, messages are divided into the following **message types** according to their importance to the process:

Message type	Description
System messages	System messages have the highest **priority level** and are subdivided into three message groups S1 to S3. Messages of this priority level cannot be configured or changed by the user.The priority level of a system message coming from the OPC server can be changed. They are used to signal fault states of the system. For a list of the system messages see ***Operators Manual Operator Station, System Messages***.
Fault messages	Fault messages have **priority levels 1 to 3**. Messages of this type are used to indicate e.g. alarm limit settings being violated.
Switch messages	Switch messages have **priority level 4**. Messages of this type are used to indicate switch events, e.g. valve open/closed.
Hints	The option exists of configuring a hint for each fault message and switch message. The configuration of such hints should give the operator the cause of the message, options for eliminating the process anomaly and if necessary further hints for operation. Hints appear only in the hint list.
Hint messages	Hint messages have **priority level 5**. They are contained only in the hint list and are solely for the operator's information.

1.2.1 Priority levels

Freelance messages which arrive from the process stations can be of varying importance for the problem-free running of the process. The Freelance system offers **six** different priority levels for messages. **Four** display colors are allocated to these.

Priority level	Message type	Display color
S1 - S3	System message	blue
1	Fault message	red
2	Fault message	orange
3	Fault message	yellow
4	Switch message	yellow
5	Hint message	yellow

The same color is used in the message line, message list and faceplates to indicate the priority level of a message.

1.3 Acknowledgment of messages

Types of acknowledgment

Two types of **message** acknowledgment are possible, **visual acknowledgment** and **point acknowledgment**.

Visual acknowledgment does not replace **point acknowledgment**, it is an additional function.

Type of acknowledgment	Description
Visual acknowledgment 	In case of visual acknowledgment the messages are marked as “viewed”. This type of acknowledgment has no effect on the current state of the message in the process station and OPC Server. This is available in the message line and the hint list. By visual acknowledgment in the message line all listed entries are deleted. However, they are still present in the message list. Through the acknowledgment in the hint list the hint or hint message is marked as acknowledged. Acknowledging a hint does not affect the acknowledgement status of the associated message.
Point acknowledgment 	This type of acknowledgment is available in the message list, faceplates and the graphic displays, in case of appropriate configuration also in the message line. It performs an acknowledgment of the message in the process station. This changes the status of the message.

Acknowledgment levels of messages

The acknowledgment strategy comprises three different acknowledgment levels.

Acknowledgment level	Description
1	Highest acknowledgment level. Messages with this acknowledgement level must be acknowledged for **incoming**(1) and **outgoing**(2) messages
2	Messages must only be acknowledged when **incoming**.
3	Messages do not have to be acknowledged.

(1) A message is designated **incoming** when the situation giving rise to it has just occurred. It is thus entered for the first time in the message line and message list.
Example: A message generated when a process value exceeds its limit will be considered as **incoming** until the value returns to the “normal zone”

(2) A message is designated **outgoing** when the situation that caused it is **no longer active**. In some cases, acknowledgment must be used to remove these messages from the message line and the message list.
Example: A message generated when a process value exceeds its limit will be considered as **outgoing** when the associated value is again in the “normal zone”.

Acknowledgment in the message line and message list

Depending on configuration, acknowledgment in the message line is by means of visual acknowledgment or normal acknowledgment. The acknowledgement type being active can be recognized by the mode of display of the button:

Visual acknowledgment:  Point acknowledgment: 

Only point acknowledgment is available in the message list. The appropriate buttons can be found in the operating element area.

Acknowledgment influences the message status and the following combinations can be configured:

Acknowledgment level	Message incoming not acknowl.	Message incoming acknowl. once	Message outgoing not acknowl.	Message outgoing acknowl. once	Message outgoing acknowl. twice
1	Full symbol flashing	Full symbol static	Empty symbol flashing	Empty symbol static	Not visible
2	Full symbol flashing	Full symbol static	Empty symbol flashing	Not visible	Not visible
3	Full symbol flashing	Not visible	Not visible	Not visible	Not visible

An **incoming** message is active in the process station.

An **outgoing** message is no longer active in the process station.

The **full symbol** is displayed at the left in the message list. It is displayed as white or black text on a colored background. The background color depends on the priority.

The **empty symbol** is also displayed at the left in the message list. It is displayed as colored text on a gray background. The text color (number and sign) depends on the priority.

Acknowledgment in the hint list

Only **visual acknowledgment** is possible in the hint list. Visual acknowledgment has no influence on the display of messages nor on their acknowledgment level in the message list. The display of hints depends on visual acknowledgment and the state of the corresponding message.

Message incoming and not acknowledged	Message incoming and acknowledged	Message out-going and not acknowledged	Message out-going and acknowledged
Black text on yellow background	White text on a black background	Black text on a white background	Not visible

1.3.1 Filtering messages

The operation dialogs of the message and hint lists offer options for filtering messages. These are filters for plant areas, priority levels and system message groups. The filter settings assumed on selection of the relevant list can be configured. This filter setting can only be made more restrictive if modified in operation.

1.4 Acoustic messages, field horn and control room horn

For local alarming, field horns can be connected to a binary output of the process stations. For central alarming in the control room one control room horn can be connected to each Operator station.

The horns can be activated by:

- preprocessed field signals
- messages from the function blocks.
- system messages
- messages from the OPC Server

Horn function blocks must also be configured in the process stations.

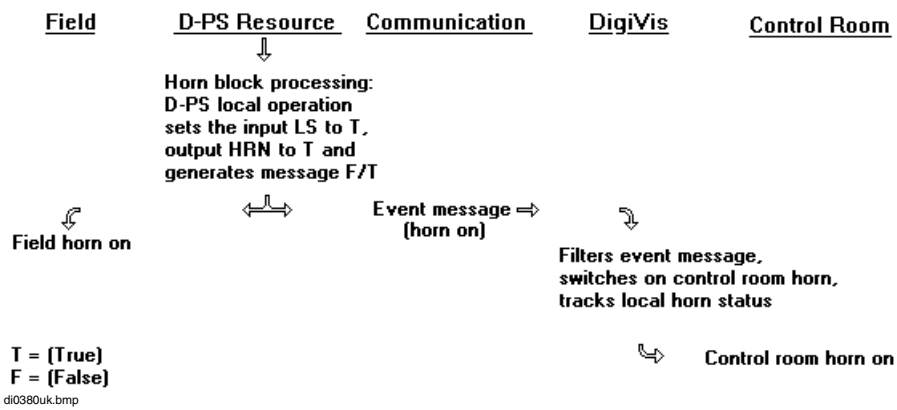
1.4.1 Activating horns by field signals

After preprocessing the field signals, a resulting binary signal must be connected to the input of the horn function block.

To activate the control room horn, an event message is generated by the horn function block. Freelance Operations activates the control room horn after evaluating this message.

To address the field horn, the output of the horn function block is connected to the field horn via a binary output.

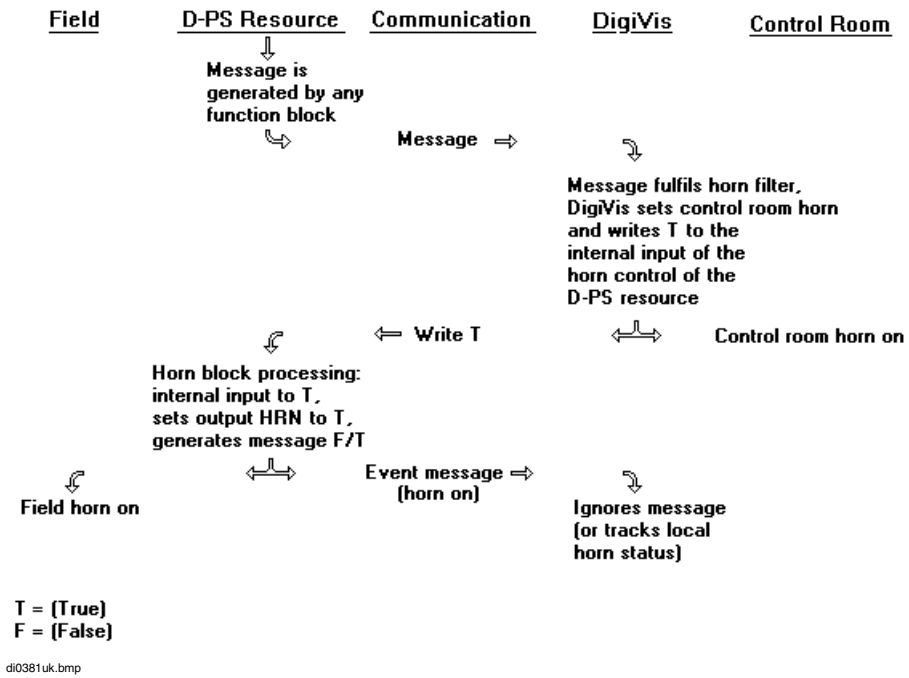
An event message is an internal message of the Freelance system. It is not visible to the operator. Event messages are used at points where a Freelance process station is able to control a function in the Operator station directly. Examples of this are the horn function and logs.



1.4.2 Activating horns by messages

Freelance Operations evaluates the incoming messages from the process stations. If an incoming message passes the set horn filter, the control room horn is activated by Freelance Operations directly.

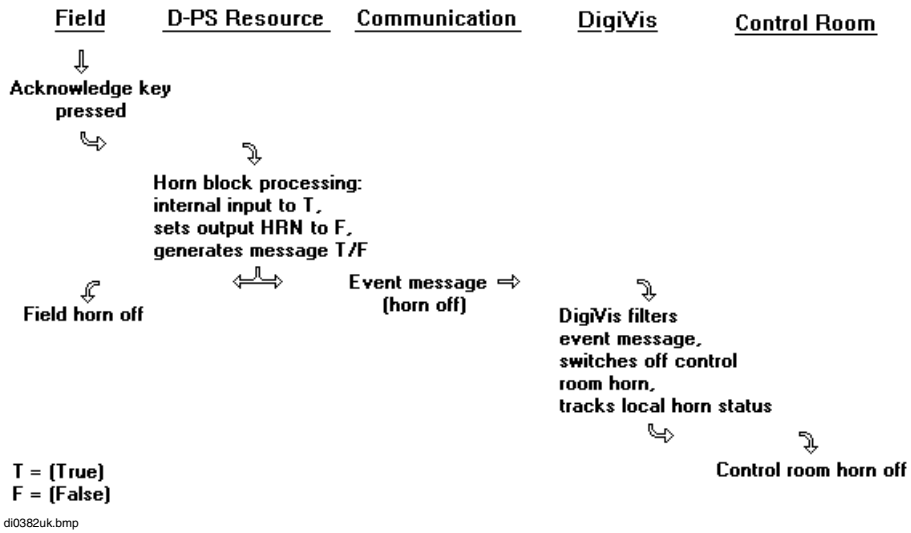
If an incoming message passes the set horn filter and a field horn must be activated, Freelance Operations writes a logic-1 signal to an internal input of the respective horn function block. The field horn is switched on. As feedback, an event message is generated and sent to Freelance Operations.



1.4.3 Acknowledgment in the field

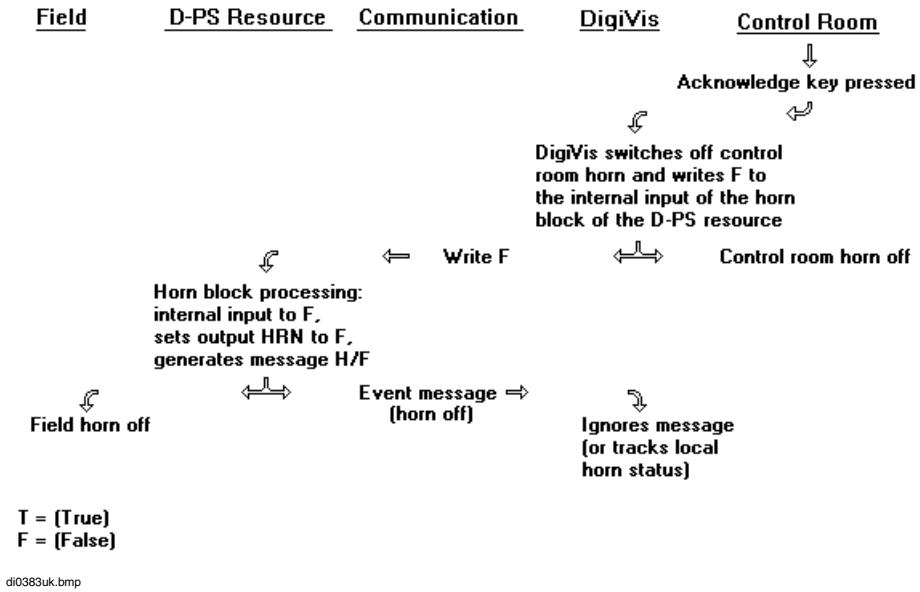
After pressing the field acknowledge button, which must be connected to the input LR of the horn function block, an active field horn is switched off directly.

An activated control room horn can also be acknowledged from the field. In this case the horn function block generates an event message. After receiving this message Freelance Operations switches the control room horn off.



1.4.4 Acknowledgment in the control room

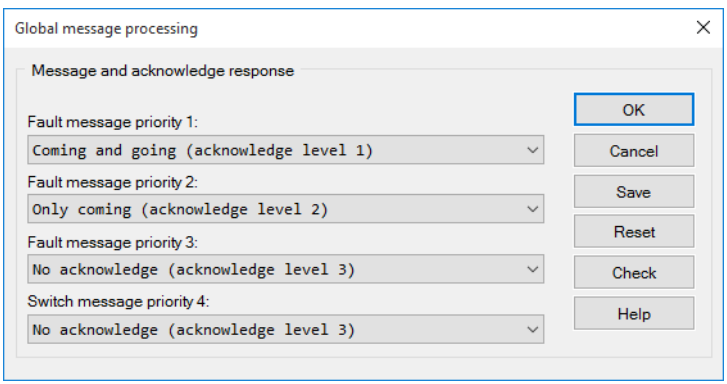
On selection of the **Horn off** button, Freelance Operations switches off an active control room horn. In the case of an active field horn, a logic-0 signal is written to the internal input of the respective horn function block by Freelance Operations. The field horn is switched off. As feedback, the horn function block sends an event message back to Freelance Operations.



1.5 Global message processing

Using global message processing you can determine the message and acknowledgment behavior of messages on priority levels 1 to 4. These settings apply to the whole Freelance system.

In the **Project tree > System > Global message processing**



Global message list.png

These settings cannot be changed in Freelance Operations.

The acknowledgment strategies used can be set for fault messages (priority levels 1 to 3) and for switch messages (priority level 4). It is possible to choose from three possible acknowledgment strategies for each priority.

System messages and hint messages cannot be configured with a type of acknowledgment but have a fixed setting. System messages have acknowledgment levels 2 and 3, hint messages always have acknowledgment level 3.

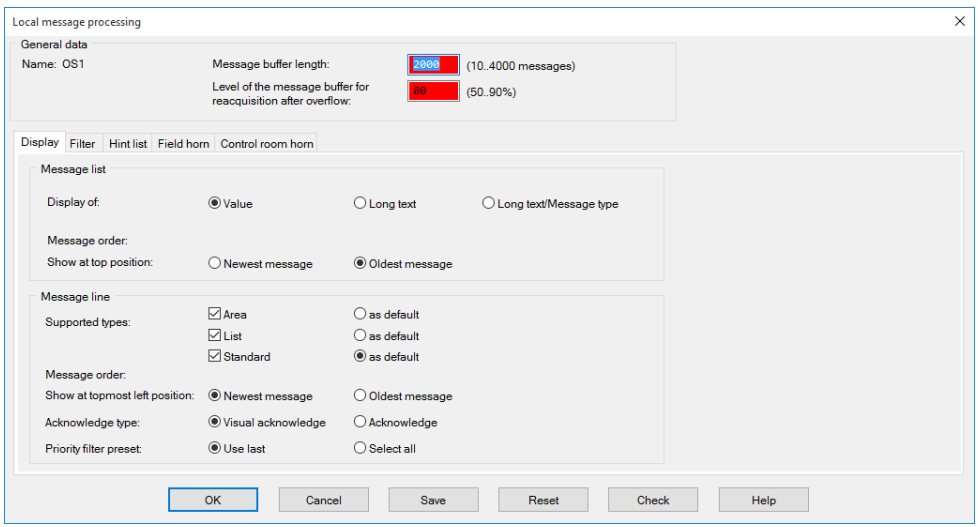
1.6 Local message processing

The local settings apply to individual operator stations. These include the settings for the message line, message list, message list, hint list and horn activation.

Select **Operator station** in the Project tree > **System** > **Local message processing**

Or

Double-click on Operator station in the Project tree



local message processing.png

General data

Name Name of Operator station

Message buffer length

This number defines the number of possible entries in the message list at the Operator station. A minimum of 10 entries must be configured and a maximum of 4000 can be configured.

Level of the message buffer for reacquisition after overflow

This number defines the nominal level of the message list after an overflow. After an overflow has occurred, entries in the message list are deleted in accordance with a displacement algorithm. This is

repeated until the level within the message list corresponds to the value stated here. The positive-displacement algorithm is composed of the following steps:

1) Deletion of hint messages.
2) Deletion of active, acknowledged messages. First the oldest message is deleted and then more recent messages are deleted consecutively. Deletion begins with priority level 4 and continues consecutively to priority level 0.
3) Deletion of the oldest inactive, unacknowledged message. Otherwise the same as **2)**.
4) Deletion of the oldest active, unacknowledged message. Otherwise the same as **2)**.

1.6.1 Display tab

Message list

Display of Selecting **Value, Long text** or **Long text/Message type** specifies the output format of the messages in the message list at the control station.

Formats A choice of different information items is available for the process messages, depending on the selected output format:

Value	Sound	Priority	Time	Plant area	Tag name	S-Text	ST-Text	M-value, Dim.	Type	Date
Long	Sound	Priority	Time	Plant area	Tag name	S-Text	L-Text	ST-Text		Date
Message type	Sound	Priority	Time	Plant area	Tag name	S-Text	L-Text	Type		Date

System messages have a fixed display format.

System message	Sound	Group	Time	Plant area	Tag name	Fault text	Date

Description:

Sound	Label identifying messages connected with a configured sound file. Only messages for which an audio file has been configured during the function block configuration are marked. General sound configurations for all the messages of one priority in the local message processing (see “Tone type” under Control room horn tab on page 37) are not visualized here.
Priority	Priority of the message with indication of whether incoming or outgoing.
Group	System message group; specified by system.
Time	Time of occurrence of the message. The resolution is 1/1000s.
Plant area	Plant area to which the tag name is allocated.
Tag name	Name of the tag which generated the message.
S-Text	Short text for the tag.
L-Text	Long text for the tag.
ST-Text	Status text of the message.
Measured value	Measured value registered when the message was generated, e.g. limit value.
Dim	Dimension of the measured value.
Type	Every message has a message type. For limit values, the message type is the limit value type (e.g. HH for the second high limit value).
Date	Only shown with the first message and after a date change. A date change is indicated by a horizontal red line.
Fault text	Explains the fault which has occurred in the case of a system message.
Message order	Defines which of the messages (the latest or the oldest one) is to appear at the topmost position of the message page.

Message line

Supported types

Defines which of the three views of the message line (plant area, list, standard) are to be selectable in Freelance Operations and which one of the three is to be the default setting.

Message order

Defines whether the latest or the oldest message is to appear in the message line in standard view at the top on the left or in list view at the top.

Acknowledge type

With **Acknowledgment type** it is possible to choose between **visual acknowledge** and **point acknowledge**.
In case of **visual acknowledgment**  will appear in the message line. Messages in the message line are only visually acknowledged and must be acknowledged in the message list.
In case of **point acknowledgment**  will appear in the message line. Messages in the message line are acknowledged normally.

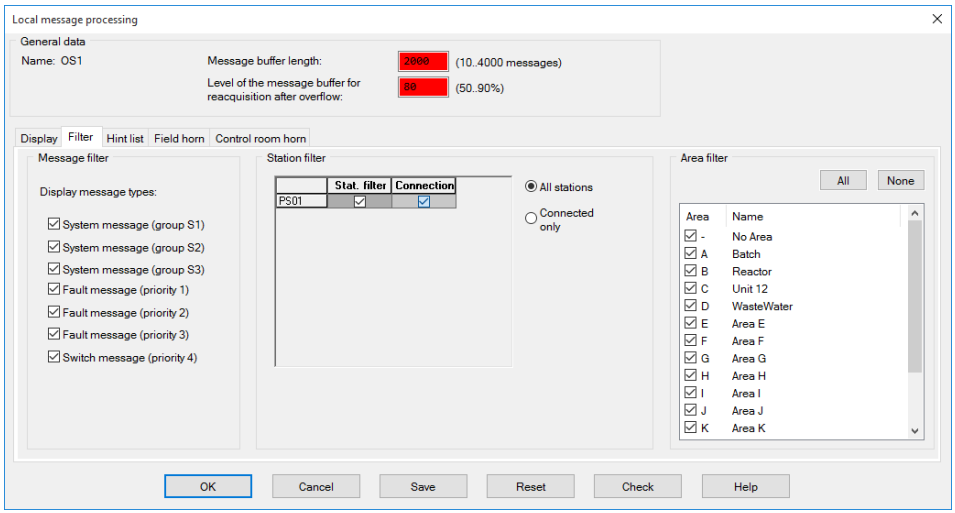
Priority filter preset

Here you can choose whether a preset priority filter is to be used for the next message list to open.

Use last If a (area related) message page is opened, the messages will be filtered according to the priority filters set last.

Select all When a message page is called up, the messages of all priorities are displayed.

1.6.2 Filter tab



Filter.png

The filters set here determine the way in which the message line, message list and hint list are displayed.

The message filter settings are default settings which are taken over loading the control station. They can be modified by the user for message and hint list but only to make them more restrictive. This means that further filter settings can be added but ones which have already been configured cannot be turned off.

Message filter Determines which messages appear in the message list. Settings can be configured for the system message groups, priority levels and plant areas.

Station filter Only messages from the selected process stations will be displayed.

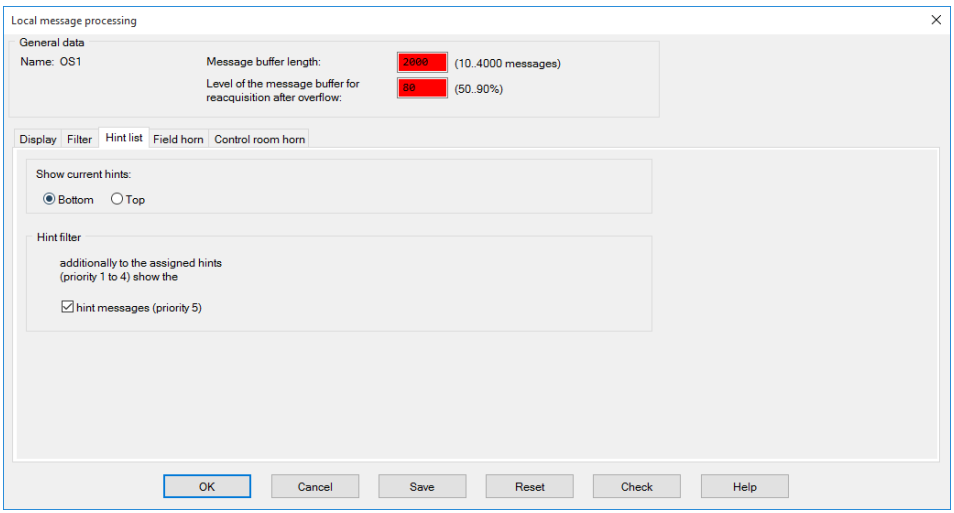
All stations All configured resources will be shown in the adjacent list.

Connected only
Only those resources to which a connection has been configured will be displayed in the adjacent list.

Area filter Determines from which areas messages will be displayed.

1.6.3 Hint list tab

In the hint list both hints which are configured in relation to messages of the priority levels 1 to 4 and independent hint messages (messages of priority level 5) are displayed.



Hint.png

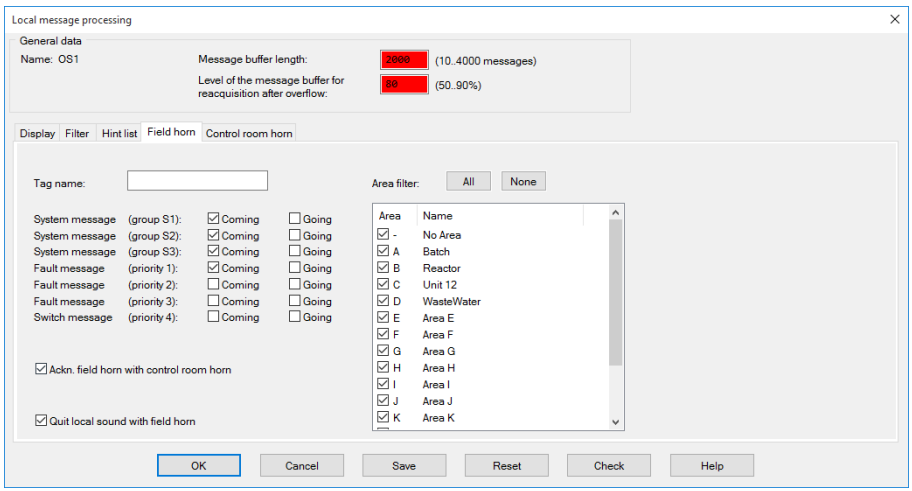
Show current hints

Defines the position of the latest hint in the hint list.

Hint filter This determines whether only the hints for priority levels 1 to 4 are to be shown in the hint list, or whether the (priority 5) hint messages are also to be included.

1.6.4 Field horn tab

Binary signals control the field horn. Therefore, a function block HORN must be configured. See ***Engineering Manual Functions and Function Blocks***, ***Monitoring function blocks***.



Field horn.png

Tag name Name of the assigned HORN function block on the process station. When you press the function key F2, a list of the available horn function blocks will be displayed for selection.

Messages For system message groups S1 to S3 and priority levels 1 to 4 it is possible to indicate whether the field horn is to sound when messages are ***Coming*** or ***Going*** or for both.

Area filter Determines, from which areas messages should control the field horn.

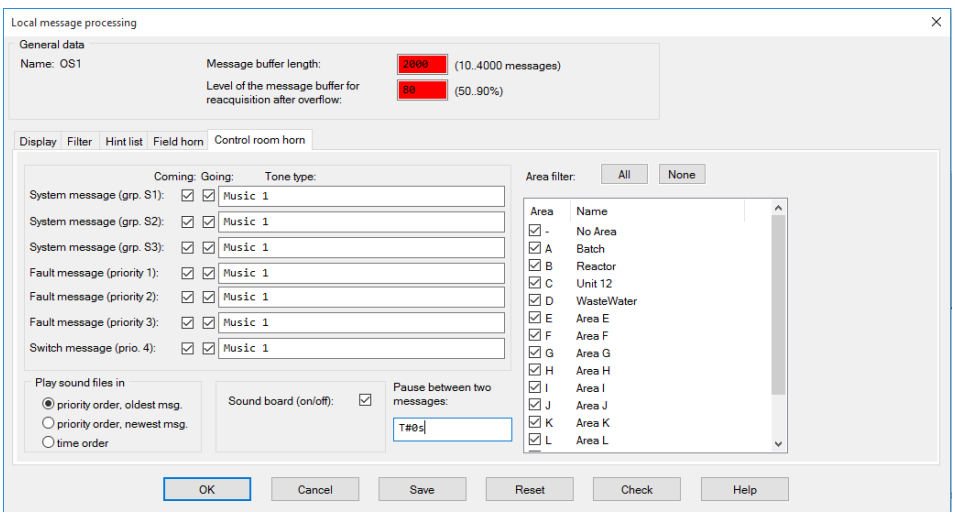
Ackn. field horn with control room horn
If the field horn is acknowledged together with the control room horn (the control box is activated), the field horn is reset as soon as the control room horn at the Operator station has been acknowledged. If this field is not activated, it cannot be reset by the Operator station!

Quit local sound with field horn
☑ The local sound system on the operator station PC is

deactivated by acknowledging the field horn. Which of the operator stations has acknowledged the field horn is of no significance in this case.

1.6.5 Control room horn tab

The notification that an event has occurred can also, in addition to the field horn, be made by a **sound board** in the operator station PC (control room horn).



Control room horn.png

Messages For system message groups S1 to S3 and priority levels 1 to 4 it is possible to indicate whether the control room horn is to sound when messages are ***Coming*** or ***Going*** or for both.

Tone type For each priority, several sound files (WAVE files) may be entered with or without extensions. These files will be played back in succession and with no interval.
The system loads the files from the Freelance standard directory <FreelanceData>\wave. It is also possible to indicate the whole path with directory and file names, such as c:\winnt\media\..... The entry may have a maximum number of 100 characters. In accordance with the **Play sound files in** setting, the sound system of the

operator station will play the selected files for coming and going messages.

The sound files configured here, are not marked by the sound symbol at the beginning of a line in the message list.

Play sound files in

In addition to the sound files configured here for the various priorities, audio files can also be configured for individual process messages. The following three alternatives can be used to control their processing under Freelance Operations.

Priority order, oldest mesg/Priority order, newest mesg

The audio files of the most important message are repeated until the message is acknowledged or superseded by a more important message.

Time order The audio files of all incoming messages are played back once, each in the order in which the messages arise. See also ***Operators Manual Operator Station***, ***Messages and Hints***, ***Messages with sound files***.

Sound board ☑ The sound system of the operator station PC is active.

☐ The sound system of the operator station PC is inactive. Configured sound files will not be played.

Pause between two messages

The minimal interval interposed between audio files for different messages or between repetitions of the same sound file for a particular message.

Area filter Determines, from which areas messages control the control room horn.

2 Standard displays

2.1 Display access

2.1.1 General description - Display access

The display access is a convenient means of quickly calling up the displays assigned to the selected tag during process operation, thus obtaining selective information on the plant status.‘

After having selected the required tag in Freelance Operations you can select the directly callable displays through the **Context menu**:

- The overview display “<Name> (Over.)”
- The system overview “System display (Sys.)”
- The message list “Messages (Mess.)”
- The faceplate “<Tag name>”.

Configuring the display access you can assign additionally to each tag the control aspect (see below), a selected display of each display and log type, as well as an “External aspect” to open any document or application.

One display of the following display and log types can be assigned to each tag:

- Graphic display (FGR),
- Group display (GRP),
- Trend display (TR_D-OS),
- Signal sequence log (SSL),
- Operation log (OPL),
- Disturbance course log (DCL_D-OS),

- Time scheduler display (TS_D-OS),
- SFC display (SFCP),
- WEB display (WEB).
- Excel report (REPORT)

If one of these displays is configured as default display, the associated entry will appear as the topmost one in the context menu; therefore the display can be selected extremely fast.

Control Aspect

If the program **Control Aspect** has been installed additionally on the Freelance Operations PC, the context menu of a tag contains the entry *Control aspect*. After having selected this entry, the program which this tag has been configured in will be displayed together with the current process variables.

tt0001_us.png

See ***Operators Manual Operator Station***, ***Operating Philosophy***.

2.1.2 Automatic display allocation

With the default setting display allocations can be specified automatically by the system. This serves to reduce the effort for configuration.

When display allocation is called up, and when a plausibility check is carried out on an Operator station, the tags, displays and logs contained in the configuration database are checked. For each tag, usage is established in the instances of all display types and log types.

When usage of a tag is discovered, the display or log is indicated as an entry for the display allocation. If no usage nor cross reference is found, this is indicated by the entry "<*auto*>".

If the corresponding tag is used in such a type of display at a later point in time, the display will automatically be assigned to the tag.

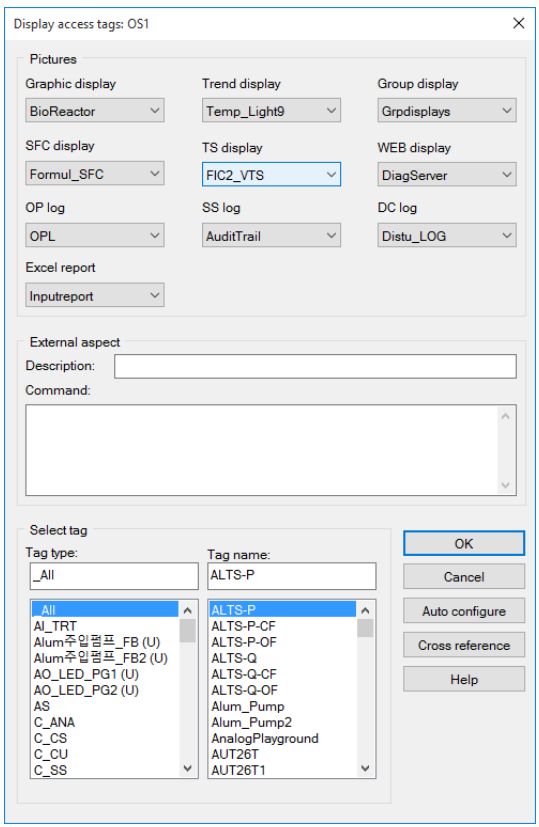
2.1.3 Open display access

After selecting an Operator station resource in the Project tree, the displays and logs stored there can be assigned to a tag.

If the Common display pool (P-CD) is selected, the chosen Display access applies for all Operator stations of the project. However, if the Display access is chosen later for an Operator station resource, the settings previously defined in the Common display pool are overwritten for this resource.

> Select in the Project tree an Operator station resource or Common display pool > **System** > **Display access**

2.1.4 Structure of the parameter definition dialog – Display access



Display Access.png

2.1.5 Display access editor

The **tag** which the displays and logs are assigned to is selected through the windows **Tag type** and **Tag name**. The type is selected in the window **Tag type**. A list of all the tags of this type that are present in the system appears in the window **Tag name**. Having selected one of the tag names from the window **Tag name**, for each display/log type you can enter one of the displays and logs provided by selecting it.

Select tag

Tag type	List of all tag types
Tag name	List of all tags of one type with their names

Pictures One display or log of each type can be assigned to each tag. The currently selected assignment is indicated in the field; when you press the edit field, a list of the available displays is displayed for selection.

<auto> Automatic display access of this display or log type for the selected tag. If the entry <*auto*> is selected, the data base will be checked automatically and the display name of the first reference found will be entered in the field.

<empty> No display allocation of this display or log type for the selected tag. If <empty> is selected, no reference will be entered for the corresponding display or log type.

<name> All available displays or logs of the corresponding type are listed and can be selected for display allocation.

External aspect

Description Entry of any text. This text will be displayed as the bottom entry in the context menu of the tag in Freelance Operations.

Command Entry of any command line, for example, Notepad ReadMe.txt. With it documentations or Excel files can be linked to tags.

If this possibility is used, the free access to the operating system from Freelance Operations cannot be avoided any more.

Auto configure

The display allocation is changed to <auto> for all tags. As a result, allocations that might have been configured before will be deleted.

Cross reference

The list of cross references is displayed for the selected tag.

Default display

> Click on display type
or
> Select **Default display** from the context menu for the display name

Display type is designated with (V)

If several display types have been entered for one tag name, it is possible to designate a certain display type. The latter is then in the first place of the context menu under Freelance Operations. In all cases, only one of the entered displays can be designated as a default display. To change the default designation, simply click another display type.

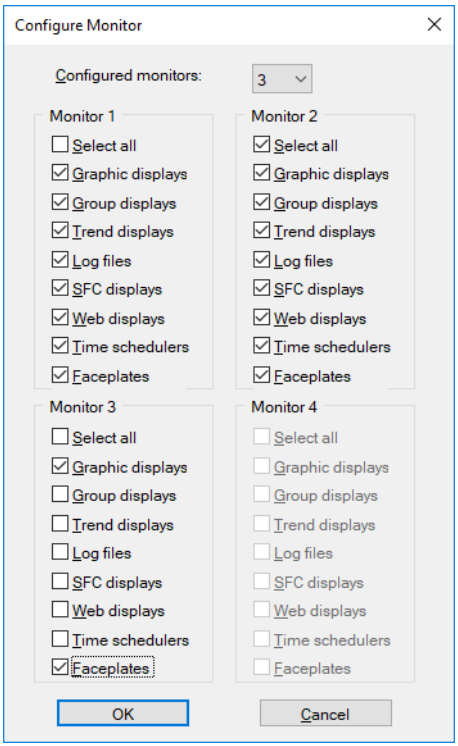
2.2 Multi Monitor

Multi Monitor means Freelance Operations supports up to four monitors for better operation and visibility. With this option, user shall be able to customize the display types according to user's request. User can decide to allow or forbid the display types on each monitor via the settings in Freelance Engineering.

2.2.1 Multi Monitor configuration on Freelance Engineering

Launch Freelance Engineering.

> Select in the project tree an Operator station resource D-OS, right-click and select **Header**... > **Configure monitor**.



Conf_Monitor_us.png

Select the monitor numbers from the drop-down list.

Tick the checkbox to select the display type for each monitor and click OK to save the settings.

Carry on plausibility check to count the total number of graphic objects.

If the total number of graphic objects exceeds the limit, an error message pops up after the plausibility check.

Increasing the amount of values which are displayed will lead to a higher amount of data which have to be transferred from the active automation to the Freelance Operator stations. This may lead to overload situations on the Freelance Controller or Operation stations which have to be avoided.

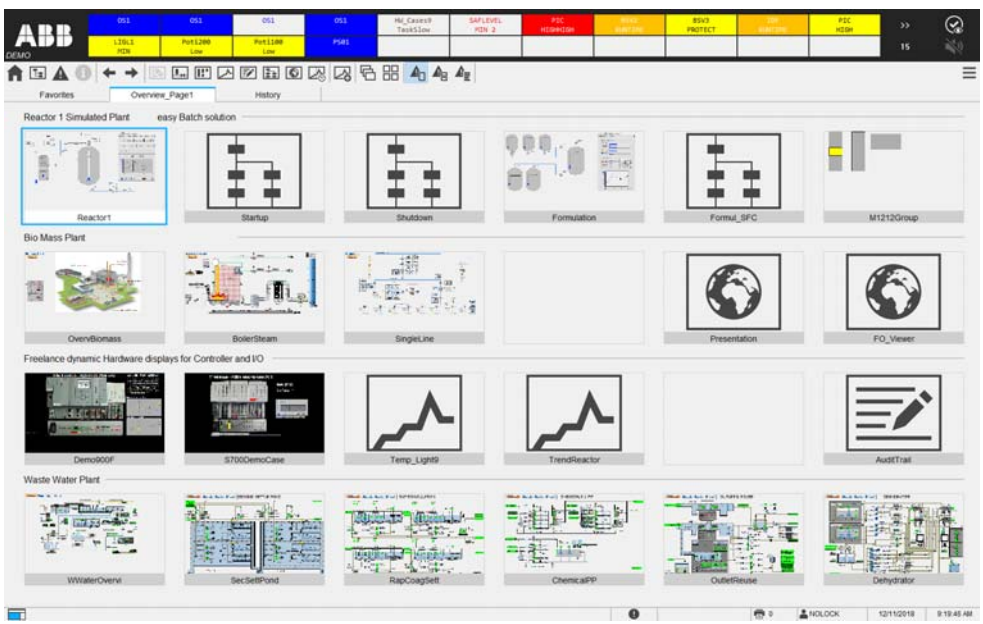
If a dynamic object does not receive a value, it is represented by a red cross. In this case, the error message in the Windows event log can be used for further error analysis and the configuration should be adjusted.

2.2.2 Multi Monitor display on Freelance Operations

After completing the configuration on Freelance Engineering, user shall carry out the plausibility check and load the whole station to Freelance Operations. Some interfaces on Freelance Operations such as Overview display, tool bar or menu bar will change according to the monitor configuration as documented below:

Overview display

On the Overview panel, the selected types in Freelance Engineering displayed as normal, and the unselected types are presented with an eye icon. User cannot operate the disabled display types.



Overview

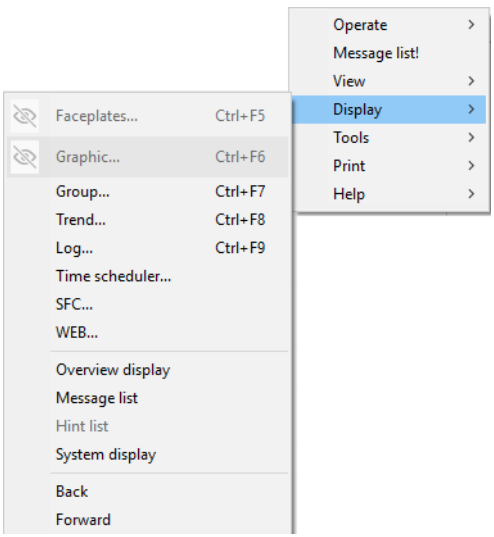
Toolbar

On the toolbar, the selected display types are displayed as normal. If the display types are configured not to display on the monitor, the icon of the display type in Toolbar is grayed out for operation.

Toolbar

Menu entry

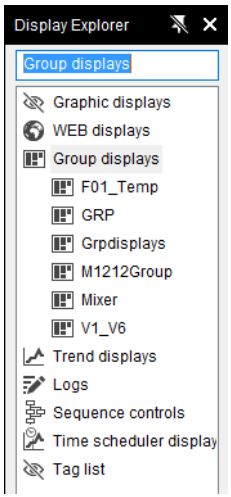
In Menu entry, the selected display types are displayed as normal. If the display types are configured disabled on the monitor, the icons of the display type in Menu entry are grayed out for operation.



Menu Entry

Display explorer

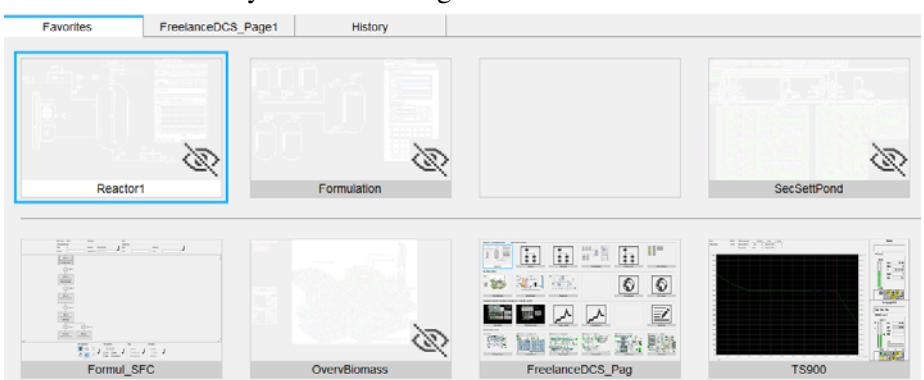
In Display explorer, the display types configured as selected in Freelance Engineering are displayed as normal. And the ones configured as do not display on the monitor are grayed out for configuration.



Display explorer

Favorites

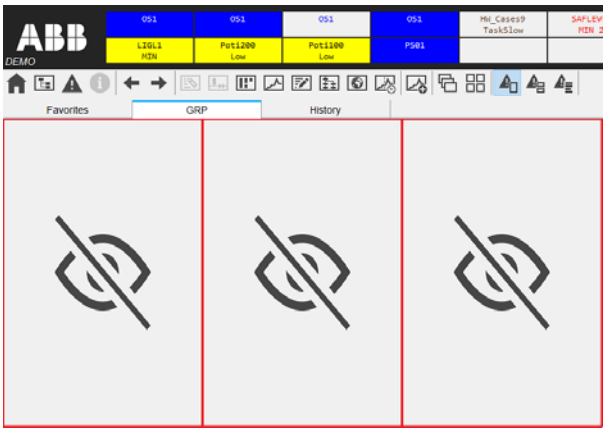
In Favorites panel, the display types configured as selected in Freelance Engineering are displayed as normal. And the ones configured as do not display on the monitor are marked with an eye icon on the right lower conner.



Display in Favorites

Group display

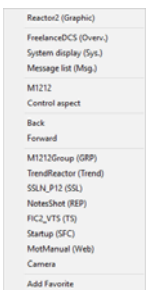
In Group display panel, if the display type of faceplates is configured as do not display on the monitor, then it will be displayed with an eye icon.



Display in Group Display

Control Aspect

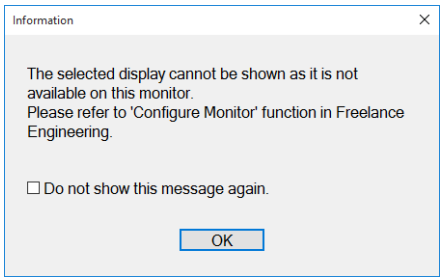
when there are display types configured as not display on the monitor, in the Control Aspect panel, those display types are grayed out for configuration.



Control Aspect

Action for graphic objects

For some graphic objects contain other objects, if the objects type is set to not display on this monitor, user is unable to access with a prompt saying the display type cannot be shown.



FGR contains objects.png

2.2.3 Multi Monitor license

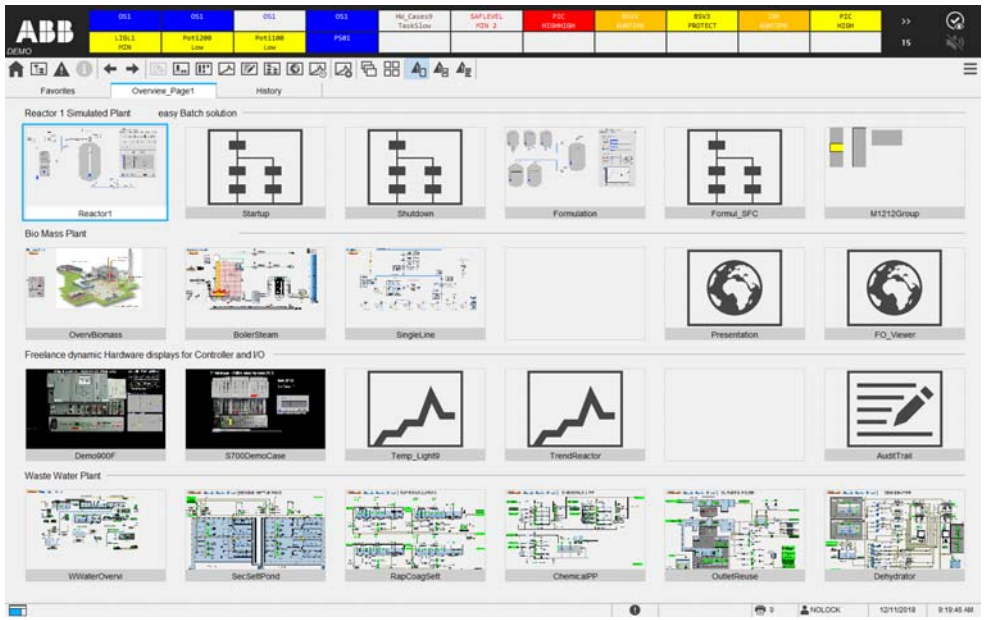
Freelance supports up to four monitors, and accordingly it requires the correct license key. After loading the monitor configuration from Freelance Engineering to Freelance Operations, Freelance Operations detects the configured monitors and the license number for monitors. If the configured monitors in Freelance Engineering are more than the available licensed, Freelance Operations goes to emergency mode. User has to re-configure the monitor numbers from OS header in Freelance Engineering, or upgrade the Freelance license.

2.3 Overview display

2.3.1 General description – Overview display

During a Freelance project, one Overview display can be configured for every Operation station. It consists of 16 lines with 6 columns each. A maximum of 96 displays can be represented and selected as symbols.

Existing displays, reports and logs can be listed in a plant-specific manner, using a selector list. A freely assignable plant text and the line headers are used to enhance clarity.



ovewview.png

2.3.2 Create an overview display

An Overview display is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

> Select an Operator station resource or Common display pool in the Project tree

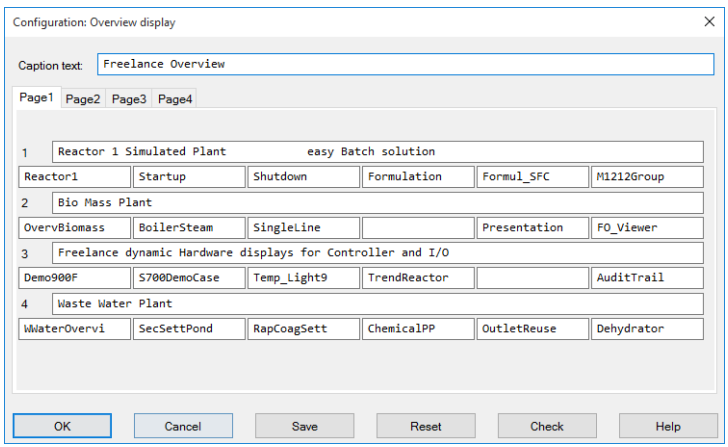
> **Edit** > **Insert next level** > **Overview display**
or
Right-click > **Insert** > **next level** > **Overview display**

If an overview display is configured in the Common display pool, this Overview display will be available in all Operator stations.

2.3.3 Configure an overview display

> **Double-click** on the name of the overview display in the Project tree

Displays and logs, which had been entered into the overview display but were later deleted, are displayed in red in the configuration dialog and are reported as non-existent in the error list during a plausibility check.



Overview display

Caption text Maximum 48 characters

Tabs **Page 1** to **Page 4**
The overview display is configured on 4 pages with 4 lines each.

<1...4> Line header. Maximum 77 characters per line

The numbers specified here depend on the particular page and/or tab.

Segment Name of the display or log entered (six per line)

Enter display names

> Select an Overview display segment > **right-click** > **Select** > Select display type and display name from the Select display dialog > **OK**

Or

> Select an Overview display segment > Enter display name

The **display list** may also be called up pressing the function key **F2**. In the window that appears, all the displays and logs available at this Operator station are displayed classified by display types.

If the display name is entered directly, the system will check whether or not the corresponding display exists. The name of an existing display will appear in black, the one of a non-existent display in red.

Abbreviations in the Select display dialog

DCL_D-OS	Disturbance course log
FGR	Graphic display
GRP	Group display
OPL	Operation log
REPORT	Excel report
SFCP	Sequential function chart display
SSL1	Signal sequence log 1 (direct output to the printer)
SSLN	Signal sequence log N (manual output to the printer)
TR_D-OS	Trend display
TS_D-OS	Time scheduler display
WEB	WEB display

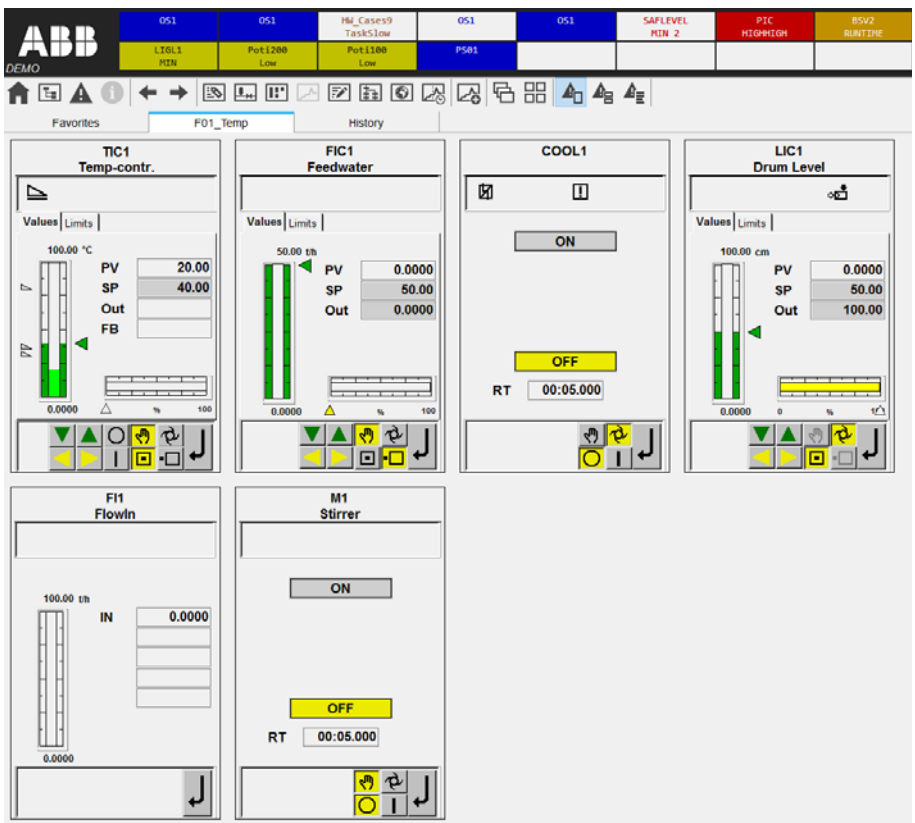
Plausibility check

The Overview display is checked for syntactical and contextual errors. If errors are found, they are displayed in a list. Implausible display and log names are shown in red in the configuration dialog, plausible ones are shown in black.

2.4 Group display

2.4.1 General description – Group display

For each Group display you may enter a short and a long text which are displayed in Freelance Operations in the title line next to the display name. This way a Group display can be assigned to a process segment. Existing tags can be entered using the tag selection dialog. Accordingly, the standardized representations of tags (faceplates) become an integral part of the Group display.



Group display.png

When configuring a Group display, a distinction has to be made between standard screen monitors and wide screen monitors. On a standard screen, up to five tags can be shown next to each other, whereas a maximum of six tags is possible with a wide

screen monitor. Two standard or four small faceplates can be arranged one on top of the other.

If not all the displays can be shown completely in the display area, a horizontal scroll bar will appear in Freelance Operations below the Group display.

2.4.2 Create a group display

A Group display is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

> Select an Operator station resource or Common display pool in the Project tree

> **Edit** > **Insert next level** > **Group display**
Or
Right-click > **Insert** > **next level** > **Group display**

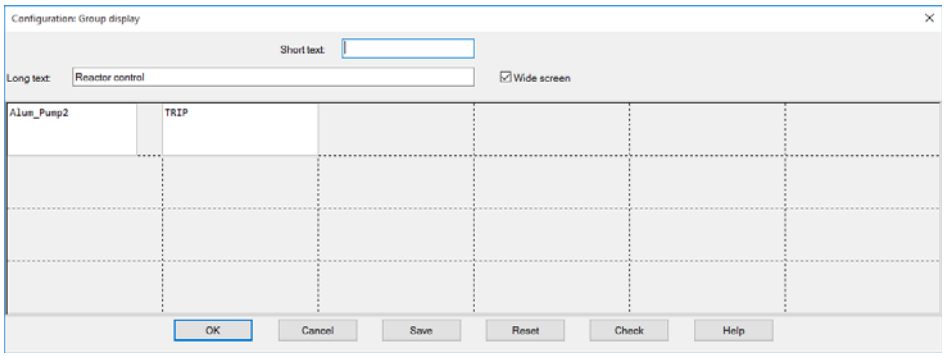
If a Group display is configured in the Common display pool (P-CD), this Group display will be available in all Operator stations.

2.4.3 Group display configuration

> Double-click the name of the Group display in the Project tree
or
> Select the Group display using the arrow keys > ENTER

Tags that had been entered but were later deleted, are displayed in red in the configuration dialog and are reported as non-existent in the error list during a plausibility check.

In a Group display either 5 x 2 or 6 x 2 standard faceplates can be combined. As faceplates may also have other formats, such as small standard faceplates or custom faceplates of user-defined function blocks, the Group display allows you to arrange faceplates in a 30 x 4 or 36 x 4 units raster. Faceplates must not overlap.



Group display configuration.png

Short text Maximum 12 characters

Long text Maximum 30 characters

In Freelance Operations, short text and long text are displayed, additionally to the display and/or log name, in the title line

Wide screen

☑ Six columns are available for the display of the faceplates.
☐ The right-most column of the configuration area is “blacked” and it is not possible to insert a faceplate in this area.

Due to the different formats of the faceplates, however, the right-most area may be occupied after the import of a project of previous Freelance versions. If you do not use a wide screen, you should look for another place for the faceplates placed in the black area and to be precise it should be either within the Group display or in a new Group display to be created. The latter will occur especially in case of a group display with 24 binary faceplates imported from a previous Freelance version. In the current Group display, there is space for maximally 20 binary faceplates if the wide screen format is not supported.

Enter a tag

> Select Group display segment by left-clicking with the mouse or by using the TAB key and the arrow keys > **double-click** or press **F2** > select tag

In the **Select Tag** dialog, all the tags configured so far are listed according to function types.

> Select function type and name from the tag selection dialog > **OK**

See ***Engineering Manual***, ***Functions and Function Blocks***, ***Abbreviations***.

Plausibility check

The group display is checked for syntactical and contextual errors. If errors are found, they are displayed in a list. Implausible entries for tags are displayed in red in the configuration dialog, the plausible ones are displayed in black.

2.5 Trend display

2.5.1 General description – Trend display

The Trend display makes it possible to graphically display the development of process variables for a period of time. Up to six process variables can be depicted in each Trend display. The number of Trend displays per Operator station is unlimited.

A Trend display can be used to visualize either the data acquired by a Trend data acquisition block or any process variables.

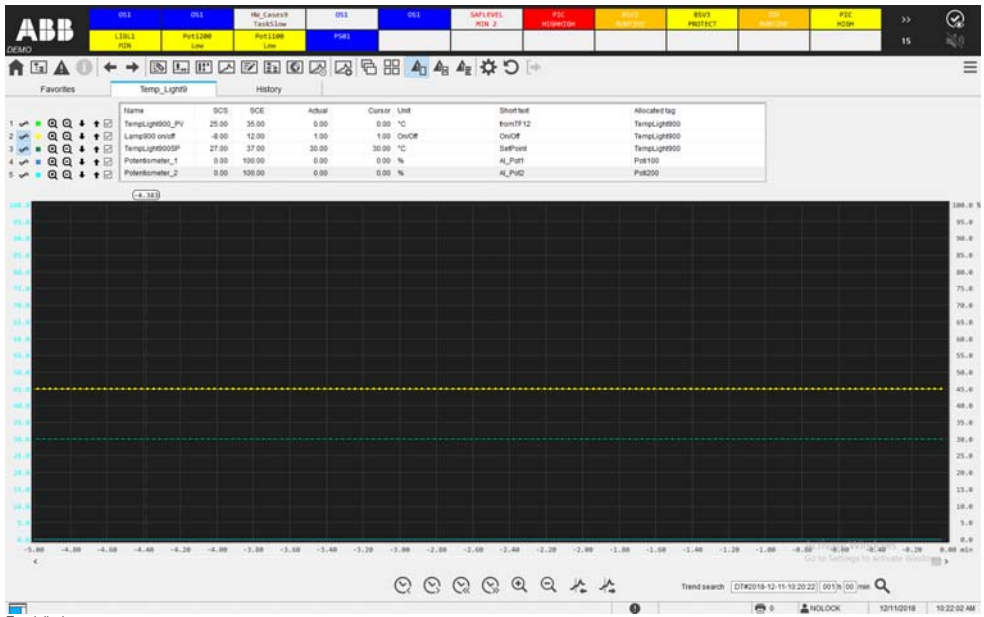
If a Trend data acquisition block is used, up to six values are acquired with their respective time stamps and placed in a buffer memory with 200 values per signal and, if required, transferred to the Operator station for **Long term archival**. See ***Engineering Manual***, ***Functions and Function Blocks***, ***Trend data acquisition blocks***.

Any six variables from the Freelance system may be specified for configuring a free trend display. An additional variable with the data type DATE&TIME can also be configured for each process variable. The value of this variable is used as a time stamp for the process value.

If no separate time-stamp variable is specified, then for variables from a Freelance process station the associated system variable **<resource_name>.DateTime** is used. In the case of variables read from an OPC server into the Freelance system, the **OPC-server time stamp** that was supplied with them is used.

In order to use a free Trend display a Gateway station of type ‘TRN gateway’ must be configured in the Project tree. See ***Engineering Manual System Configuration***, ***Project tree***.

An operator on a Freelance Operator station may also configure a free Trend display acquiring any process variables from a Freelance system if a Gateway station of type ‘TRN gateway’ has been configured in the project.



Trend display.png

2.5.2 Create a trend display

A Trend display is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

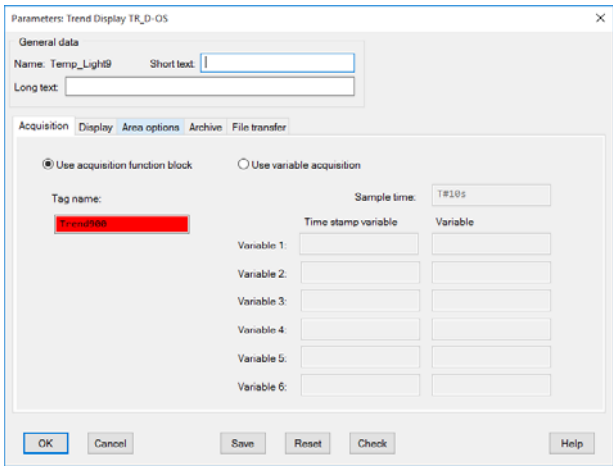
> Select an Operator station resource or Common display pool in the Project tree

> **Edit** > **Insert next level** > **Trend display**
Or
Right-click > **Insert** > **next level** > **Trend display**

2.5.3 Configure a trend display

> Double-click on the name of the Trend display in the Project tree
Or
> Select Trend display from the project tree > **Edit** > **Program**

The Trend display configuration comprises one parameter definition dialog with five tabs.



Trend Acquisition.png

General data

Name Trend display name, editable in the Project tree.

Short text Maximum 12 characters

Long text Maximum 30 characters

The short and long texts are also printed along with the project documentation.

Acquisition tab

Use acquisition function block/Use variable acquisition
Parameter specifying whether the Trend display is based on data from a Trend data acquisition block or on independent process variables.

In the Common display pool (P-CD), only Trend displays with variable acquisition can be used.

Tag name Name of the Trend data acquisition block in the process station. Pressing the function key **F2** you can select a Trend data acquisition block.

Sample time In the time interval configured, the process variables are read and stored as trend data.

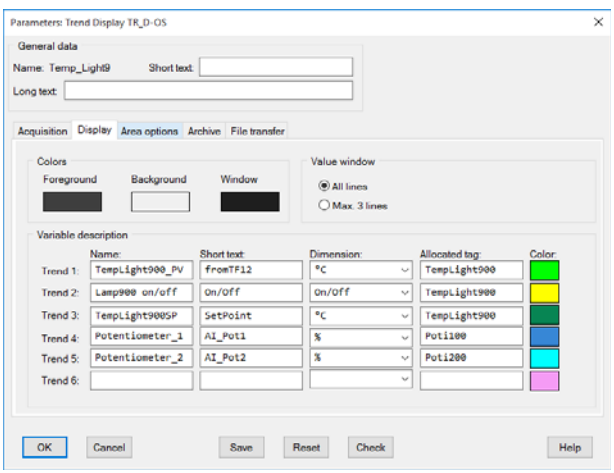
Variables 1 ... 6

Variable Name of the free trend variable. The function key **F2** is used to open the list of known variables in the system.

Time stamp variable

Name of the process variable whose value is used as the time stamp for the variables entered under **value**. The function key **F2** is used to open the list of known variables of data type DT in the system. If no separate time-stamp variable is specified, then for variables from a Freelance process station, the associated system variable **<resource_name>.DateTime** is used; in the case of variables read from an OPC server into the Freelance system, on the other hand, the OPC-server time stamp that was supplied with them is used.

Display tab



Trend display.png

Colors Selection of colors for foreground, background and window of the Trend display (3 colors).

Variable description

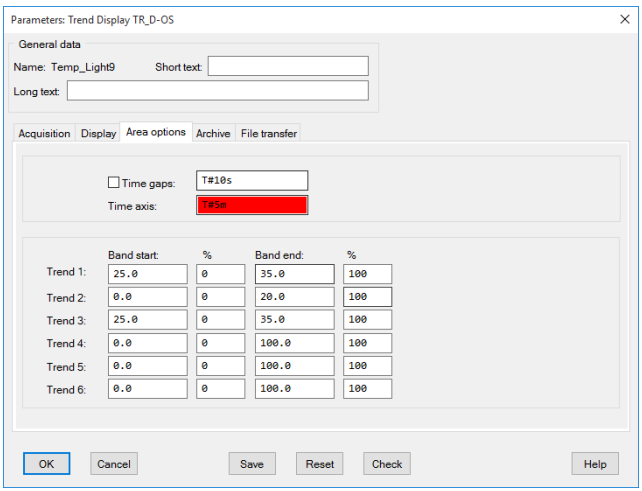
For display in the Trend display a **name**, **short text**, **dimension** and a **tag** are assigned to each trend. The number of trends is equal to

	the number of connected inputs on the trend acquisition module or the number of entered trend variables.
Name	The **Name** assigned to the trend.
Short text	The **Short text** assigned to the trend.
Dimension	**Dimension** assigned to the trend. The **Dimension** can be entered directly or can be selected from an existing list, using the arrow keys or mouse.
Allocated tag	Tag name whose faceplate can be opened in Freelance Operations by double-click.
Color	Color selection for each trend curve. All colors available for graphic displays are available. Default settings for color*:*

Trend 1	signal red
Trend 2	signal yellow
Trend 3	signal blue
Trend 4	signal green
Trend 5	signal cyanide
Trend 6	medium magenta

The text entries or text selection for Name, Short text and Dimension are depicted in Freelance Operations with the trend. These entries are not mandatory.

Area options tab



Trend Area.png

Area options The parameter definition of position comprises the time range for depiction on the X-axis, the definition of scaling on the Y-axis and band start/band end for up to six trends.

Time gaps Maximum time interval between two successive time stamps of a value. The values in this internal are interpolated (see ***Operators Manual Operator Station, Trend Display, Interpolation***). Entry is made according to IEC 1131-3 time format.
If no time gap detection is configured Freelance Operations will display three times the cycle time as gap. Example: With a cycle time of 10s a data gap of 30s will be displayed as a gap in the trend even if no gap detection is configured.

Time axis The time axis specifies the scale on the X-axis for the trend depiction in Freelance Operations. Entry is made according to IEC1131-3 time format. The **maximum value is around T#24d20h31m23s**. Example: T#2147s or T#24d20h31m23s

Band start The **Band start** specifies the value for the scale start of the Y-axis for depicting an individual trend. See display “Example of the trend depiction” on the following page.
Values are entered as real numbers. The value range is between 0.0

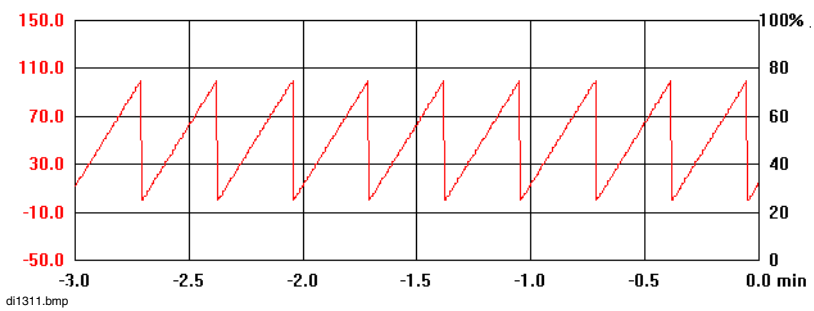
and ±9999999999.9. The value for the band start must be less than the value for the band end.

% The percentage value specifies the position of the scale start for **Band start %** on the Y-axis. See figure below.
The percentage values must be entered as integers. The value range is between 0 and ±5000%.

Band end The **Band end** specifies the value for the scale end of the Y-axis for depicting and for the individual trend. See figure below.
Values are entered as real numbers. The value range is between 0.0 and ±9999999999.9. The value for the band end must be greater than the value for the band start.

% The percentage value specifies the position of the scale end for **Band end %** on the Y-axis. See figure below.
The percentage values must be entered as integers. The value range is between -5000 and +5000%.

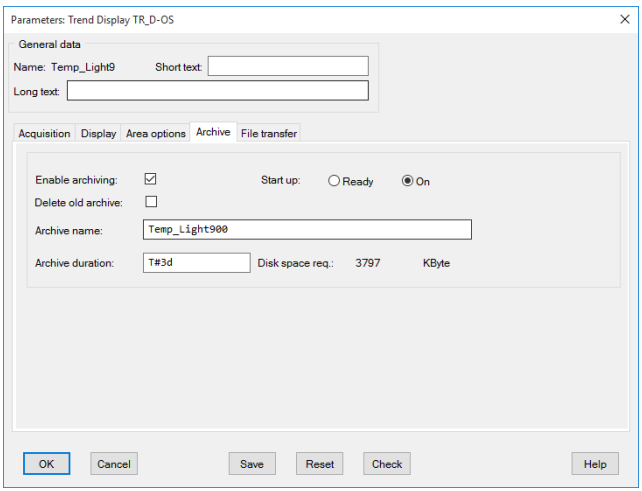
Example of a trend display:



The following settings have been chosen for the parameter definition of the position:

Band end:	-10.0	Band end:	110.0
Band start %:	20	Band end %:	80

Archive tab



Trend Archive.png

Archive A decision is made whether the trend data archiving is to be enabled on the Operator station. If **Enable archiving** is selected, specify the following: **Archive duration**, **Start up** mode and if you want to **Delete the old archive**. On the Operator station only one **trend display** with a fixed size configured for an archive file (as ring memory).

Enable archiving

☑ The trend data are archived as a function of the *Start up mode*.

Delete old archive

☑ The old archive will be deleted on restarting the Operator station (new start of Freelance Operations).

☐ Archiving is resumed with a chronological gap after a restart.

If archives do not match after a restart, e.g. the number of trends have changed in the meantime, the old archive is saved as a file. The old archive files are assigned a serial extension from 001 to 999.

Archive duration

The *Archive duration* is entered according to the IEC 1131-3 time format. The entry can be made in days, hours, minutes and seconds. Inputs less than 1 s lead to error.

Maximum 24855d = 68 years
Example: T#24855d or T#24d20h31m23s
Apart from the input field for the archive duration, the maximum hard disk requirements for archiving on the Operator station are given in kilobytes.

The size of the trend file is determined by the archive duration. This size can never be exceeded by the Trend file since data are stored in a ring memory. This means that on reaching the archive duration, the oldest data are always overwritten again by the current data.

The archive files should not be greater than 1 Gbyte, in order to limit the load time in Freelance Operations.

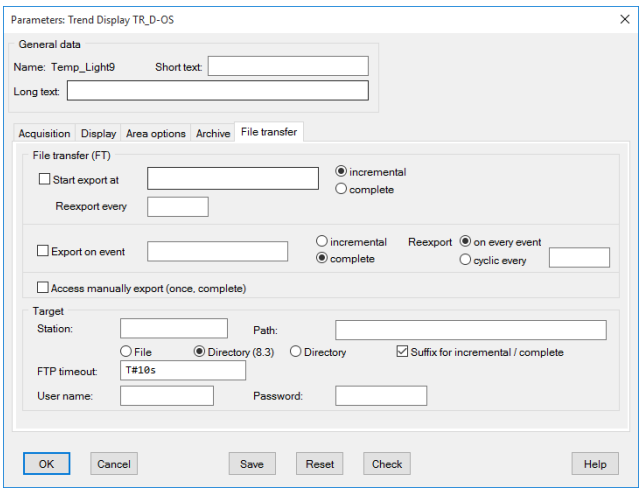
Start up (only for displays that get data from a Trend acquisition block) The Start up defines whether trend data recording and archiving should start immediately after starting Freelance Operations.

Ready ◉ Acquisition and archiving are ready but not yet started after starting the Operator station. Start is triggered by changing a flank at one input of the trend acquisition module. See ***Engineering Manual***, ***Functions and Function Blocks***, ***Trend acquisition blocks***.

On ◉ Acquisition and archiving are switched on after starting the Operator station.

Archive name The file name for the trend archive file on the Operator station hard disk can be specified.

File transfer tab



Trend FT.png

File transfer Here it is decided whether - and in what way - a copy of the trend file should be transferred from the Freelance Operations PC to another PC in the Freelance net. The PC that is to receive the archives must be a communications subscriber in the net (network card and installed FTP server, see ***Getting Started Manual***). It is also possible to export the Archive file to a Windows drive of the Freelance Operations-PC.
To visualize the trend archive data and to convert them into the CSV format, the Freelance supplementary program Archive Browser can be used for this PC.

File transfer (FT)

Start export at Cyclical transfer enabled as soon as the configured time is reached. Make entry in the DT format.

☑ Start time for the cyclical data transfer
☐ No cyclical data transfer.

Reexport every Here it is determined at which time periods data transfer is effected. Make entry in the TIME format.

incremental ◉ Only the data acquired since the last data transfer are transmitted.

complete ◉ All archived data are transmitted.

Export on event

☑ Data transfer takes place as a function of the state of the entered event module. It is compulsory to input an event module. The function key **F2** is used to open a selection list showing the available event modules.

☐ No event-controlled data transfer.

incremental ◉ Only the data acquired since the last data transfer are transmitted.

complete ◉ All archived data are transmitted.

Reexport

on every event ◉ Data transfer will occur only in case an event flank increases.

cyclic every ◉ Data transfer will occur only when an event flank increases. From this period on, the data transfer will be effected cyclically as long as the event is current.
Which time periods the data transfer should follow are determined here. Make entry in the TIME format.

Access manually export (once, complete)

☑ The operator at the Operator station can enable file transfer.
☐ File transfer cannot be enabled manually.

Target Here the target of the file transfer must be defined. As a target a PC connected to the Freelance network is used. Ideally, the supplementary package Archive Browser should be installed on this PC to permit visualization of archive files of the trend and of logs.

Station Specification of the IP Address of the target computer. If you operate your Freelance system in a network, you should obtain the IP addresses from your network manager, as this address must be chosen unambiguously throughout the world. If you want to use the Freelance Operations PC as file transfer target, its IP address must be given here.

Path If the archive files are to be copied into a specified directory, the complete directory name must be given here. It is important to enter a backslash **** as last character. If e.g. only **C:\temp** is given as

directory, the file **c:\tempXXXX.001** is generated on the target computer, with the Xs denoting the first four characters of the configured archive name.

It must be noted that the target station is responsible for further processing of the files during export. The copied file is only temporary and is overwritten again with the next export of the corresponding archive.

File ◉ The export files are saved in the file name given under target path.

Directory (8.3) ◉ The export files are saved in the directory given under the target path with names generated by the system using the current date and time. The file name has a length of 8 characters with a 3 characters extension.

Directory ◉ The export files are saved in the directory given under the target path with a name generated by the system using the given name and the current date and time.

Suffix for incremental/complete

☑ In order to distinguish between files containing complete or incremental data sets, either '**_INC**' or '**_FULL**' is appended to the basic file name. This suffix prevents a situation from occurring where complete and incremental files are allowed to overwrite one another.

FTP timeout FTP services are synchronous services. To prevent blocking the system, a maximum time, in which an FTP service must have been executed, must be specified.

User name This user name must be entered. If necessary, this name is checked by the FTP server.

Password This password can be defined when setting up the receiving PC. This ensures that only the subscriber who knows this password can store files in the PC. In this manner abuse or manipulation by non-authorized subscribers can be prevented in open nets.

2.6 Sequential function chart display

2.6.1 General description - SFC display

The Sequential function chart (SFC) is a user-defined net of steps and transitions. The action block is defined as a step and the step-enabling condition as a transition. Steps and transitions are represented by graphic symbols. The representation, symbol type and color of the symbols depend on the status of the steps and transitions. Each SFC program begins with an Initial Step and ends with an End Transition. All steps are inactive during initialization of the SFC program. The initial step is activated at the start of the SFC program, all other steps are inactive. The start of the SFC program begins with its Enable, that is, New Start or Repeat Time have been reached or have expired. The end transition terminates one sequence function chart run. After this all steps are once again in the inactive state.

For the configuration of the Sequential function chart (SFC) and the corresponding terms, see ***Engineering Manual IEC 61131-3 Programming***, ***Sequential function chart (SFC)***.

SFC.png

2.6.2 Create an SFC display

A SFC display is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

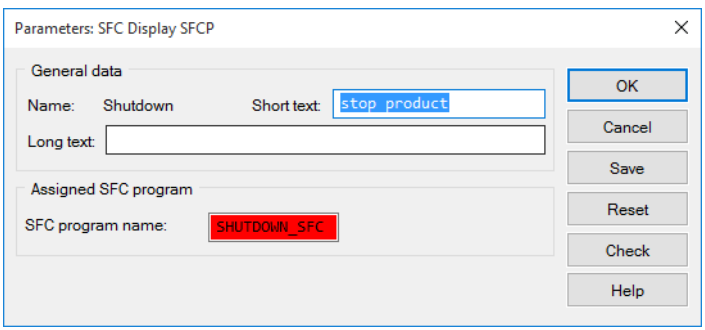
> Select an Operator station resource or the Common display pool (P-CD) in the Project tree

> **Edit** > **Insert next level** > **SFC display**
Or
Right-click > **Insert** > **next level** > **SFC display**

If a SFC display is configured in the Common display pool (P-CD), this SFC display will be available in all Operator stations.

2.6.3 Configure an SFC display

> **Double-click** on the name of the SFC display in the Project tree



SFCP.png

General data

Name SFC display name, editable in the Project tree

Short text Maximum 12 characters

Long text Maximum 30 characters

Assigned SFC program

Here, the name of the sequential function chart program of the process station to be operated with the help of the SFC display has

to be entered. You may either enter the name directly through keyboard or press **F2** to open the list of the available sequential function chart programs and select the required program.

2.7 Time scheduler display

2.7.1 General description – Time scheduler display

With a time scheduler, time-dependent analog values are output and can be sent to other functions, for example, to a controller as a set point input. In addition to the **Time scheduler faceplate,** there is an entire-page Time scheduler display.

This offers a comfortable means of displaying the set-point trend or the actual trend and of operating the time scheduler. If required, a tag can be allocated to the display whose faceplate should always be shown together with the Time scheduler display (generally the faceplate of the post-connected function block).

The Time scheduler display has been standardized and parameters must only be defined for the short and long text, the name of the allocated time scheduler and if necessary the name of an additional tag.

Time Schedule display.png

2.7.2Create a time scheduler display

A Time scheduler display is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

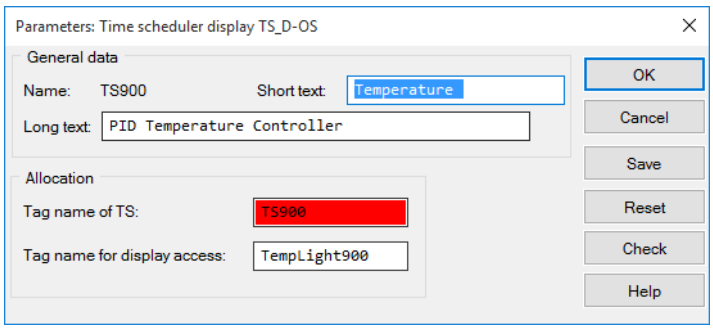
> Select an Operator station resource or the Common display pool (P-CD) in the Project tree

> **Edit** > **Insert next level** > **Time scheduler display**
Or
Right-click > **Insert** > **next level** > **Time scheduler display**

If a Time scheduler display is configured in the Common display pool (P-CD), this Time scheduler display will be available in all Operator stations.

2.7.3 Configure a time scheduler display

> **Double-click** on the Time scheduler display name in the Project tree



Time Schedule display.png

General data

Name Time scheduler display name, editable in the Project tree

Short text Maximum 12 characters

Long text Maximum 30 characters

Allocation

Tag name of TS

Name of the allocated time scheduler function block. You may either enter the name directly or press **F2** to open a list of the available function blocks and select the required function block.

Tag name for display access

Name of the module whose faceplate is displayed in the time scheduler window. This entry is optional.
The function key **F2** is used to open a list of the tags that can be entered.

2.8 WEB display

2.8.1 General description – WEB display

Calling up a WEB display in Freelance Operations you can load the local WEB browser and activate the link to the configured WEB site.

The WEB display will start the local web browser. That way the Freelance Operations user could get access to files on the local machine or on other machines within the company's network or in the global Internet. Please take into consideration the risks and dangers associated with that!

2.8.2 Create a WEB display

A WEB display is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

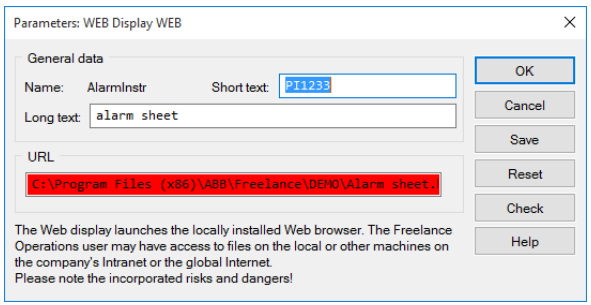
> Select an Operator station resource or the Common display pool (P-CD) in the Project tree

> **Edit** > **Insert next level** > **WEB display**
Or
Right-click > **Insert** > **next level** > **WEB display**

If a WEB display is configured in the Common display pool (P-CD), this WEB display will be available in all Operator stations.

2.8.3 Configure a WEB display

> Double-click on the name of the WEB display in the Project tree



Web.png

General data

Name	WEB display name, editable in the Project tree
Short text	Maximum 12 characters
Long text	Maximum 30 characters
URL	Link to the required WEB site.

3 Graphic display

3.1 General description – Graphic display

In addition to the standard displays, custom graphic displays for observation and operating the process can be used on an Operator station. These graphic displays can be created with the Freelance Engineering graphic editor. The state of a process can be depicted in numerous respects with such graphic displays. The static and dynamic graphic objects available make possible a varied graphic representation of the running process. Use of the various animation options makes it possible for the plant operators to observe process events in context at all times.

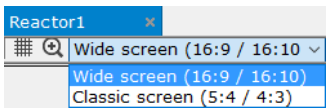
Each graphic display consists of static and dynamic elements. The static elements are made up of basic objects, such as lines, circles, texts and bitmaps. Available as dynamic elements are special graphic objects (such as alphanumeric displays and bar graphs) with which current process values can be displayed, either as numeric values or graphically. Operable elements form another category; they can be used to trigger a display switch, open a tag allocation faceplate, acknowledge a message or write values to process variables. The state of the dynamic display elements in Freelance Operations is determined by the assigned variables and messages from the common Freelance database.

Graphic symbols can be created from several single graphic objects. These new objects can then be processed further, just like any single graphic object. Graphic objects may also be defined as macros and stored in macro libraries. These libraries can be used as often as required, even in other projects.

The aspect ratio of a graphic display can be set to match the physical resolution of the monitor used:

- Widescreen format, logical resolution 14440 x 6728, suitable for 16:9 / 16:10 monitors.
- Conventional screen format, logical resolution 10240 x 6728, suitable for 5:4 / 4:3 monitors.

The aspect ratio of new graphic displays can be predefined in the header data of the operator station (D-OS). This default setting can be modified in the menu bar of the draw area:



Ratio_us.png

When a graphic display that has been created for another aspect ratio is indicated in Freelance Operations, it is scaled as required while maintaining the aspect ratio. In this case, either the full height or the full width of the available screen area is used (see Operators Manual Freelance Operations).

The zoom level, as well as the current position of the cursor in the drawing area, are displayed in a **toolbox**.

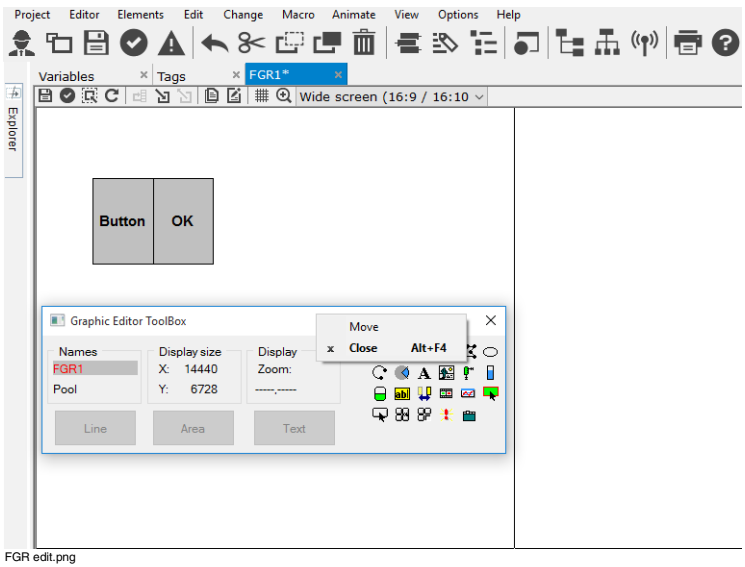
Further functions include the editing of two displays simultaneously. The first display is a named program in the Project tree. The second display, called the **graphic pool**, possesses the same graphic characteristics as the other display and is always loaded simultaneously with the project. In the graphic pool display, complete displays, partial displays or graphic symbols can be temporarily saved for later use. The contents of the graphic pool are retained when another display is selected.

To support the user in creating complex process displays, several graphic macros are prepared and provided during the installation of Freelance Engineering. Five macro libraries are copied into the directory **<FreelanceData>\macros**.

- 3D_Macros.bol: The description of this library can be found in the file ***3D_Macros Library.pdf*** in the **<FreelanceData>\macros** folder.
- hb_sym01.bol: For more information on hb_sym01.bol library, refer to Appendix - Graphic macro library on page 193.
- Macros.bol: This library contains graphic macros that simplify the creation of user defined faceplates.
- S900_UFB_macro_library.bol: This library contains graphic macros to be used with S900 device.
- ufp_sym1.bol: This library contains graphic macros that simplify the creation of user defined faceplates in the conventional design of Freelance Operations.

3.2 Graphic editor interface

The graphic area consists of the Menu bar, Toolbar, Graphic editor tab, Graphic editor toolbar, the draw area with the editor-specific toolbox and the Status bar.



FGR edit.png

3.2.1 Additional features of the graphic editor

Graphic editor behavior is based on that of standard Windows programs. In addition, the graphic editor offers a number of special functions to simplify the preparation of a graphic display and its incorporation into the project database.

Cursor keys — The cursor arrow keys can be used for precise positioning of the cursor in the draw area. With each key actuation the cursor is moved in the corresponding direction by exactly one screen pixel. When the grid is switched on, the cursor is moved by one grid unit. See Snap/Grid on page 85.

F2 key — Opens a selection list.
If a selected configuration mask field is to be filled in with a reference to some project element, the name of that element can, in general, either be typed in directly or chosen from a list of all possible entries. This list can be called up by pressing the **F2** key.

Example 1: When during configuration, the name of a process variable is expected, the list called up by pressing **F2 c**ontains all process variables that have been configured in the current project.

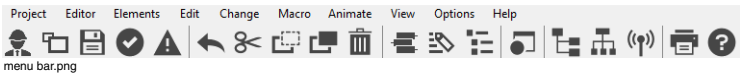
Example 2: When configuring a dynamic graphic object, the name of an associated static object is expected. Pressing **F2** brings up a list of all static graphic objects that are available in the graphic display.

F5 key — Display cross references.
If the **F5** key is pressed in an edit field containing a variable name, the list of cross references for that variable will be displayed. It is then possible to branch directly to any of the programs shown in the list.

Tool tip — If the cursor is moved over a graphic object which has had a name assigned to it, the name and type of the object is displayed in the form of a tool tip.

ESC key — As long as an object has not yet been defined completely, the configuration can be abandoned by means of the **ESC** key. The unfinished object is deleted and the graphic editor is set in standard mode.

3.2.2 Menu bar



menu bar.png

Project	General actions related to the whole project.
Editor	Performs plausibility check, indicates error list, exports and imports of the graphic display and exits the graphic editor.
Elements	Draws static graphic objects such as lines, rectangles, text and so on, inserts bitmaps and creates message type symbol.
Edit	Undoes or repeats last action, groups graphic objects to form new objects, or ungroups them again, cuts, pastes, deletes, copies and doubles graphic elements, mirrors, rotates, arranges or aligns graphic objects, places graphic objects in the foreground or background, switches to the graphic pool display.
Change	Changes attributes of lines, areas, texts and text contents, shifts or deletes points of polygons and polylines, assigns names to graphic objects, selects the background color for the display.
Macro	Loads or saves a macro library, used for creating, editing and inserting macros.
Animate	Reedits dynamic objects, creates dynamic objects, such as bar graphs, fill areas, etc.
View	Shows the complete display without editor help markings, redraws graphic, simulates self-animated objects, selects setting of zoom and visible region.
Options	Print, set grid setting, determine toolbox position, limit and resize display, activate threaded cursor and auto accept.
Help	Calls up the on-line help system.

3.2.3 Draw area

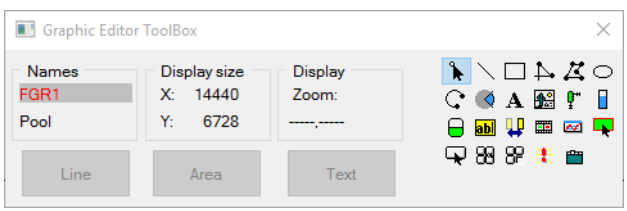
The draw area is the user's actual working area for creating and editing displays. It is located between the menu line or tool bar and the status line and fills the entire screen widthwise. With the toolbox switched on, the visible draw area may be restricted as a result of overlapping. Using the zoom function it is possible to zoom in or out on a section of the display being edited. The Overview function shows an area corresponding to 9 x the drawing size. The actual draw area is shown in the center, marked with a border.

The coordinates on the draw area run from left to right and from top to bottom. The coordinate origin is at the top left-hand corner. The coordinates of the moving graphics cursor are shown in the toolbox. In addition, the coordinates are used to indicate the position of display objects in the parameter dialogs and are shown there.

3.2.4 Toolbox

Information about the current graphic display is shown in the toolbox. This window can be positioned with the **Options > Toolbox** menu item. It can be placed at the **right, left, top** or **bottom** of the screen and it can be hidden with the **off** setting. Wherever it is originally positioned, it can be moved about freely on the screen.

The display of graphic editor, faceplate editor and macro editor is differentiated by toolbox. For example, Graphic editor toolbox, Faceplate editor toolbox and Macro editor toolbox. All editors toolbox have the same functionality. For description we are explaining only one toolbox.



Toolbox.png

Names A graphic name or the term "**Pool**" (for graphics pool) shown in red indicates that the corresponding display is the visible one. It is possible to toggle between the two displays with the **Page** ↓ or **Page** ↑ keys or with the help of the menu.

Display size Selected resolution of the X- or Y- coordinates.

Display Displays the currently selected **Zoom** setting and x/y coordinates of the cursor position.

Line Changes the global **line attributes** (line thickness, color and style). All subsequent lines receive these attributes. When selecting or drawing a line, the text **Line** disappears and a line with the pre-selected attributes is displayed on this button.

Area Changes the global **Area attributes** (foreground/background color, fill pattern). All subsequent graphic items receive these attributes. When selecting or drawing one of these items, the text **Area** disappears and a rectangle with the selected color and fill is displayed on this button.

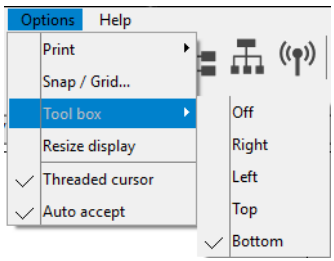
Text Changes the global **text attributes**, such as foreground/background color and type size. All subsequent texts receive these attributes. When selecting or entering text, the text type and color selected is displayed on this button.

Changes of individual graphic objects are carried out in the **Change** menu. The selection windows are described in detail in the corresponding section of this document.

The second section of the toolbox contains one button for selecting and one button for each type of graphic object. After an object type has been selected, any number of objects of the same type can be drawn one after another. This drawing mode ends when a different object type is selected or the selection button is clicked.

3.3 Basic settings for the draw area

The settings for the draw area are made through the **Options** menu.



toolbox config.png

3.3.1 Print

> **Options** > **Print** > **Display only**
> Windows print options dialog
> **OK**

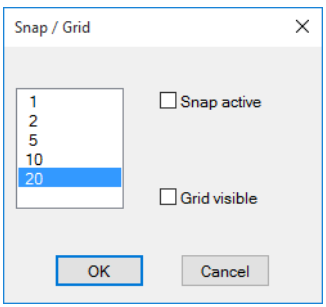
The draw area is output to the printer.

> **Options** > **Print** > **Whole screen**

The current visible content of the Freelance Engineering window is output to the printer.

3.3.2 Snap/Grid

> **Options > Snap/Grid**



snap.png

Grid size from 1 to 20

☑ Snap active, or grid visible, respectively.

In order to achieve more uniform positioning, it is possible to display a **Background grid**. There is an option of 5 fixed grid sizes. The grid setting applies both to the graphic and to the graphic pool displays. While a display is being constructed the grid can be altered and switched on and off.

When **Snap** is activated, only the grid points are available for positioning, i.e. the user does not have to click on the required grid point exactly, but only sufficiently near it. The grid point nearest to the cursor is then selected. The grid and snap settings are independent of each other, i.e. a grid may be defined without snap being activated, or snap may be activated without a visible grid.

When using the snap/grid function for configuring a graphic display it is strongly recommended to use the same monitor resolution when making later changes of that graphic display.

When the snap grid is calculated by the system, the internal drawing area is scaled to the current monitor resolution. If you should use another resolution or different system settings such as smaller or larger Windows symbols for later changes, this may affect or complicate the alignment of the graphic elements.

3.3.3 Toolbox

> **Options** > **Toolbox** > **Off, Right, Left, Top** or **Bottom**.

If **Off** is selected the toolbox is not visible. **Right**, **Left**, **Top** and **Bottom** cause the toolbox to be positioned along the respective edge of the screen.

For a description of the toolbox, see Toolbox on page 82.

3.3.4 Update display size

> **Options** > **Resize display**

This menu choice is used for adapting graphic displays from earlier versions of the software to the current standard display size which is 14440x6728.

3.3.5 Threaded cursor

> **Options** > **Threaded cursor**

Crosshairs with their intersection point at the cursor arrow are switched on. They extend over the entire draw area in the graphic display.

3.3.6 Auto Accept

> **Options** > **Auto Accept**

This option is used to suppress the Saving tab dialog box in future. For more information on Auto accept, refer to ***Engineering Manual System Configuration***.

3.3.7 Background color

> Change > Background color

Each graphic display and the graphic pool display may be assigned its own draw area background color. The background color can be set in the menu **Change**.

After selecting Background color, a window appears showing the available colors. To enable these colors to be accessed more quickly they are subdivided into a number of color groups. For background color, the following color groups are allowed Static colors, Media colors and Free colors.

3.3.8 Color selection

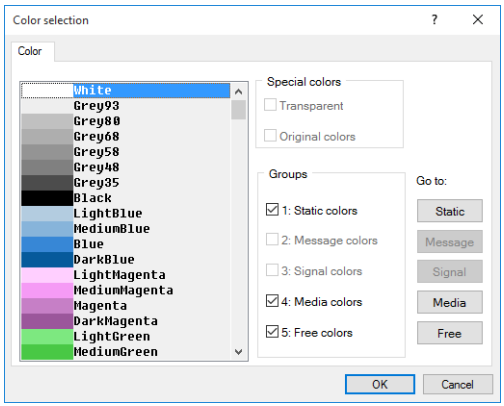
During the process of creating a graphic display, colors are specified for the background, the static graphic objects and the states of the dynamic graphic objects. All such color settings are made in the same **color selection** dialog box. This dialog box is opened from within the different alteration dialogs.

All the available colors are subdivided into various different color groups. The groups can be shown and hidden separately, and a direct jump to a particular color is also possible.

Each group can be used in any application, except display background.

The **special colors** group is an exception. The **Transparent** option can only be selected for line attributes, as a text background and for animation; it has the effect that the lines or graphic objects are displayed as transparent.

The **Original colors** setting can only be used in animation. Here, the original colors of the graphic object remain intact and are not altered by any animation color settings.



Color Selection.png

Special colors

Transparent ☑ No **color**, but invisible, that is, transparent.

Original colors

☑ The colors of the static graphic object are used.

Groups Selection of the various color groups displayed in the color selection window.

Static colors ☑ General colors.

Message colors

☑ Colors to display alarms.

Signal colors ☑ Colors to display signals.

Media colors ☑ Colors that are displayed flashing off and on.

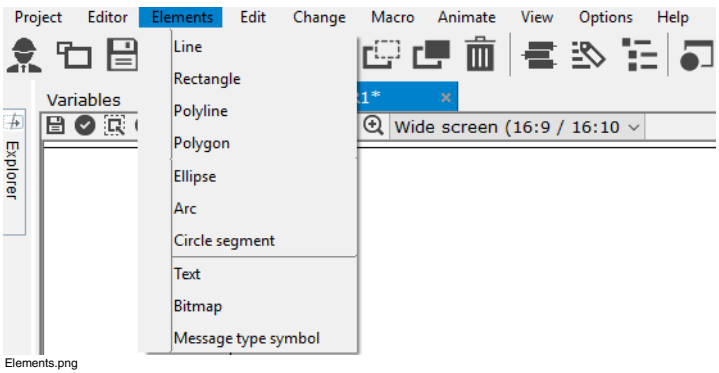
Free colors ☑ Colors for display of color graphs.

Go to After entering the **color groups** (☑) the buttons **Static**, **Message**, **Signal**, **Media**, **Free** are activated and can be selected. Following selection, the selection is positioned at the start of the selected **color** group in the **color selection** dialog box.

3.4 Drawing static graphic objects

The following static graphic objects are available: Line, rectangle, polyline, polygon, ellipse, arc, circle segment, text, bitmap and message type symbol. All static graphic objects are under the **Elements** menu.

Graphic objects are displayed with their various attributes such as color, width, style. Attributes can be altered through the toolbox or the **Change** menu. After drawing one graphic object you must select the type of the object to be drawn next from the **Elements** menu. Pressing the **F8** key you can select another object of the type just completed.



Elements.png

The appearance of the objects is determined by their attributes.

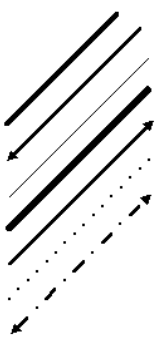
Graphics editor attributes	Settings
Line color	237 colors and invisible
Line style	continuous, dashed, dotted, dash-dotted
Linewidth	6 widths
Arrow	left/right/arrows on both sides
Rounded Corners	the corners can be rounded off in four stages
Foreground and Background	237 colors each
Fillpattern	15 patterns and invisible

Text attributes	Settings
Size	Text size in pixels
Text_direction	Horizontal or vertical
Character attributes	Bold and/or italic and/or underlined
Fix point	Start, middle, end, top and bottom
Character font	At present Arial, Courier New, Lucida Console and MS Sans Serif
Foreground color	237 character colors
Background color	237 colors and invisible

3.4.1 Line

> **Elements** > **Line**
> Mark starting point with mouse click, a construction line appears, and its end point follows the cursor arrow
> Mark end point by mouse click.

A **line** here means the shortest connection between two points.



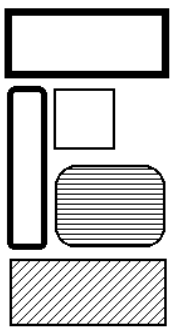
di0506.bmp

Lines are specified with the attributes **line color, line style, line width** and **line arrow**.

3.4.2 Rectangle

> **Elements** > **Rectangle**
> Mark starting corner point by clicking mouse, a frame appears, and its end corner point follows the cursor arrow
> Mark end point by clicking mouse.

A rectangle is a graphic item having four sides and four right angles. A square is a particular form of rectangle.

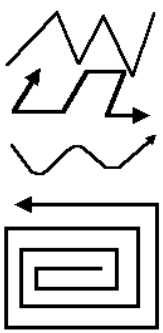


di0507.bmp

Rectangles are specified with the attributes **line color**, **line style**, **line width**, **rounded corners**, **foreground color** and **background color** and **fill pattern**.

3.4.3 Polyline

> **Elements** > **Polyline**
> Mark starting point by clicking mouse, a construction line appears, and its end point follows the cursor arrow
> Mark end point of the section by clicking mouse; this point now becomes the starting point of the next section
> Mark end point of the next section by clicking mouse
> Mark end point of the polyline by double-clicking.



di0508.bmp

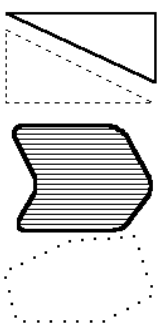
A polyline consists of any number of construction points. In each case the points are connected by lines. By activating the right-hand mouse button, the last end point is deleted and a new point can be defined.

It is possible to subsequently alter the construction points of existing polylines (see Change > Points).

Polylines are specified with the attributes **line color, line style, line width, arrow** and **rounded corners**.

3.4.4 Polygon

> **Elements > Polygon**
> Mark start by clicking mouse, a construction line appears, and its end point follows the cursor arrow
> Mark end point of the section by clicking mouse; this point now becomes the starting point of the next section
> Mark end point of the next section by clicking mouse, an area is formed
> Mark end point of the polygon by double-clicking.


di0509.bmp

A polygon is a closed frame which, like the polyline, can consist of any number of construction points. The first and the last point of the polygon are always connected.

By activating the right-hand mouse button, the last point can be deleted and a new point can be defined.

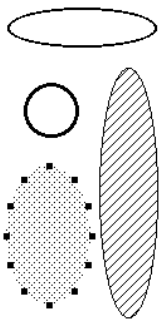
It is possible to subsequently alter the construction points of existing polygons (see **Change > Points**).

Polygons are specified with the attributes **line color, line style, line width, rounded corners, foreground color** and **background color** and **fill pattern**.

3.4.5 Ellipse

> **Elements > Ellipse**
> Mark starting point by clicking mouse, a frame appears, and its end point follows the cursor arrow
> Mark end point by clicking mouse.

The starting point lies outside the ellipse and is the corner of an invisible rectangle which bounds the ellipse. The size, position and form of the ellipse or circle is determined by moving the cursor away from the starting point.



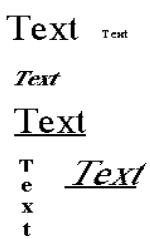
di0510.bmp

The ellipse is a closed graphic item. A special form of the ellipse is the circle.

Ellipses are specified with the attributes **line color, line style, line width, foreground color** and **background color** and **fill pattern**.

3.4.6 Text

> **Elements > Text**
> Mark starting point by clicking mouse, a text input window appears. The starting point is one of the frame's corners or center points, depending upon the settings in the text attributes dialog box.



di0513.bmp

Words, fixed numeric values or special characters can be displayed as single line.

Texts are specified with the attributes size, alignment, attributes, fix point, character font, foreground and background color.

3.4.7 Arc

> **Elements** > **Arc**
> > Mark starting point by clicking mouse, draw circle or ellipse
> > Finish it by clicking mouse
> > Mark starting point of the arc by clicking mouse, move the cursor clockwise: arc gets larger, move the cursor anti-clockwise: arc gets smaller,
> > Mark end point of the arc by clicking mouse,

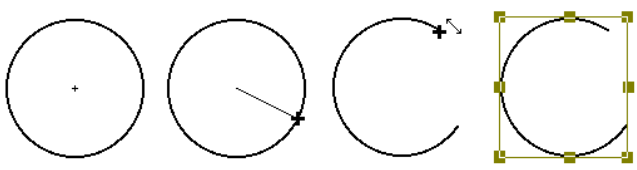
Subsequent changing of the arc size is not possible.

The arc is part of the circumference of an ellipse or a circle. The start and end points are connected by a curve.

di0512.bmp

Arcs are specified with the attributes **line color, line style, line width** and **arrow**.

Construction of an arc:



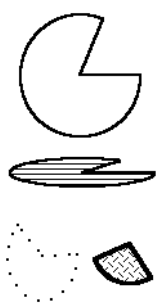
di0547uk.bmp

3.4.8 Circle segment

> **Elements > Circle Segment**
> > Mark starting point by clicking mouse, draw circle or ellipse,
> > Finish it by clicking mouse,
> > Mark starting point of the circle segment by clicking mouse,
> Moving the cursor clockwise: Circle segment gets larger,
> Moving the cursor anti-clockwise: Circle segment gets smaller,
> > Mark end point of circle segment by clicking mouse.

Subsequent changing of the segment size is not possible.

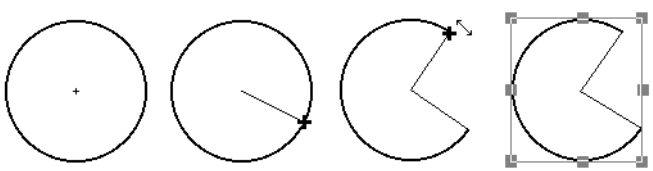
The circle segment represents a certain part of a circle or ellipse diagram. It is a closed graphic item.



di0511.bmp

Circle segments are specified with the attributes **line color, line style, line width, foreground color** and **background color** and **fill pattern**.

Construction of a circle segment:



1st step
Draw circle, press left mouse button

2nd step
Fix the starting point, press left mouse button

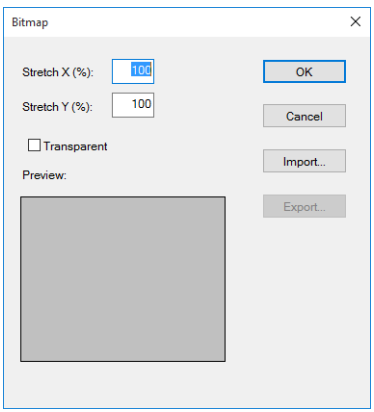
3rd step
From the starting point define the circle segment by pulling the mouse left or right along the circle

4th step
Click the left mouse button to end the construction

di0546uk.bmp

3.4.9 Bitmap

> **Elements** > **Bitmap**
> Mark the upper left-hand corner of the insertion position with a mouse-click, whereupon the bitmap dialog will appear.



Bitmap.png

Stretch X (%) Bitmap scaling on x-axis (%)

Stretch Y (%) Bitmap scaling on y-axis (%) (with the standard stretch values of 100% on each axis, the bitmap is imported with its original size, i.e. with no distortion)

Transparent ☑ Throughout the whole bitmap, all instances of the upper-left-pixel color are replaced with 'invisible'; i.e. the bitmap is imported with a transparent background color.

Preview Displays the selected bitmap

Import Opens the dialog for selecting a bitmap file.

Export Opens the dialog for writing the selected bitmap to a file.

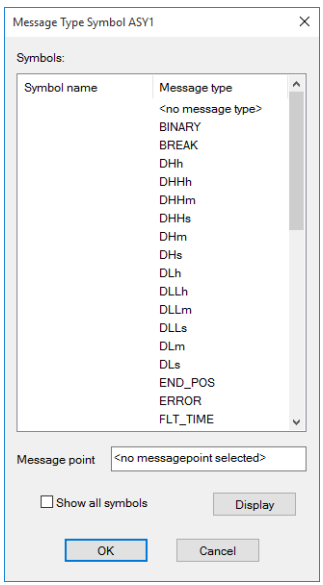
Bitmap files can be imported in BMP format. No other formats are supported at present. Imported bitmaps can be moved, scaled, mirrored and named. The contents of a bitmap cannot be altered in the graphic editor.

3.4.10 Message type symbol

> **Elements > Message type symbol**

Different static graphic objects can be displayed in Freelance Operations as a function of a message type.

This graphic object can only be used in conjunction with a graphic symbol that has been animated on message points. See Graphic symbol on page 140 and Bit allocation tab on page 106.



Elements-message type.png

Symbol name List of static graphic object names that have been assigned to a message type.

Message type List of message types used in function blocks having a faceplate. For list of message types and their meanings, see ***Engineering Manual***, ***Functions and Functions Blocks***, ***Abbreviations***, ***Message types/Limit types***.

<no message type>
The graphic object assigned here will be displayed when the associated message does not have a message type, or when the

associated conditions for displaying a message have an empty intersection.

Message point Displays the alarm points which have been configured for the graphic object.

Show all symbols
Upon switching to the graphic display, all objects assigned to this message type symbol are displayed.

Display Switch to graphic display in order to assign a static graphic object to the previously selected message type.

> Select a line in the dialog > Button **Display**
> Switch to the graphic display
> Choose an existing static graphic object or create a new one
> Return to the Message type symbol dialog with > **Edit** > **Return to object...**
> The name of the graphic object will be shown in the *Symbol name* column in front of the previously selected message type.

Or

> Select a line in the dialog window > Press **F2**
> A list of the static graphic objects in the graphic display is shown.
> Select an object from the list
> The name of the graphic object will be shown in the *Symbol name* column in front of the previously selected message type.

A static graphic object can be used as many times as required within a message type symbol. As many message types as required can be assigned graphic objects; the entire list need not be filled out.

Example 1:

The **newest** (most recent) message from the plant area is always to be depicted in Freelance Operations.

Procedure:

- Create a new message type symbol (**Draw** > **Message type symbol**).
- Draw and assign static graphic objects to the message types which are to be displayed in Freelance Operations.

- Create graphic symbols and assign all message points of the plant area.
- With the help of the animation functions, configure the system to always display the newest of the pending messages.
- Assign this graphic symbol to the previously created message type symbol.

In Freelance Operations the message type of the most recent message will be determined from the set of all assigned messages. The graphic object assigned to this message type will be displayed. If no message can be determined with the configured conditions the graphic display will be displayed for which <no message type> was configured.

The graphic display will not be updated automatically if a new tag is assigned to a plant area which is configured in the display.

Example 2:

The message type configured to a particular message point is to be depicted in Freelance Operations.

Procedure:

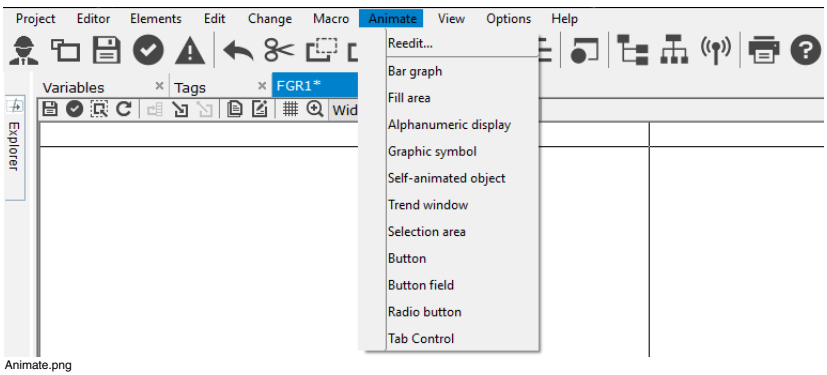
- Create a message type symbol (**Draw > Message type symbol**)
- Draw and assign a static graphic object to the message types which can be configured for the message point.
- Create a graphic symbol and assign a message point (e.g. the first message point threshold of a controller).
- Assign this graphic symbol to the previously created message type symbol.

In Freelance Operations the message type of the message point will be read and the associated graphic object will be displayed. If no message has been configured for this message point, the graphic object configured for the <no message type> entry will be displayed.

3.5 Animate, dynamic graphic objects

The class of dynamic objects includes objects used in Freelance Operations both for depicting/observing process dynamics and for operating the plant, that is, for operating on process variables. These objects will be called **observation objects**

and **operation objects** respectively. All these objects are located under the ***Animate*** menu. The variables used here for animation of the graphic display can be newly generated from within the graphic editor or, if already configured, can be selected from the variable list with the **F2** key.



Animate.png

For depicting changing process states, the most commonly used dynamic graphic objects are the following: **Bar graphs**, **Fill areas**, **Alphanumeric displays**, **Graphic symbols**, **Self-animated objects** and **Trend windows**.

The following techniques are available to animate observation objects:

- Display the current value of a variable numerically in any required format.
- Display the contents of a string variable as text.
- Display a configured message text.
- Display different static graphic objects as a function of the configured message type.
- Depict analog values with bar graphs or arbitrarily shaped fill areas, representing, for example, levels in containers.
- Have graphic objects move in the graphic display as a function of an analog value.
- Have the graphic attributes of an object (colors, line width) change as a function of binary process values.
- Have the graphic attributes (colors, line width) of an object change as a function of messages.

The dynamic graphic objects most commonly used for plant operation actions in graphic displays are the following: **Selection areas**, **Buttons**, **Button fields**, **Radio buttons** and **Tab controls**.

These operation objects can be configured to trigger the following actions in Freelance Operations:

- Open a faceplate
- Switch to any other display
- Write a fixed value to a variable
- Write an operation value to a variable
- Acknowledge a message

These operation actions can also be initiated by a display object.

In Freelance Operations, when a graphic display is updated, all dynamic objects are placed in front (on top) of any static display elements. This can be altered by making the static elements part of a dynamic object and designating them as foreground or background components within that object. Such grouping makes it possible, for example, to display scale markings on a bar graph.

3.5.1 Create a dynamic graphic object

> **Animate** > Select type of dynamic graphic object
> For a new **Bar graph**, **alphanumeric display**, **Selection field**, **Button**, **Button field**, **Radio button or Trend window** click mouse to indicate the required object position.
> Parameter definition dialog is displayed

The editing functions under the Edit menu are only partly usable on dynamic graphic objects.

The system automatically assigns a name for each new dynamic object, and the name is shown in the general section of the parameter definition dialog. It can be changed by the user at any time. Object names must be unique within a graphic display.

3.5.2 Delete dynamic graphic objects

> Select dynamic graphic object > **Edit** > **Delete**.
Or
> Select dynamic graphic object > Press **DEL key**

3.5.3 Moving and sizing of dynamic objects

On selecting a dynamic graphic object, a frame appears surrounding it. Just as in the case of static graphic objects, the dynamic object can be changed in size or moved about.

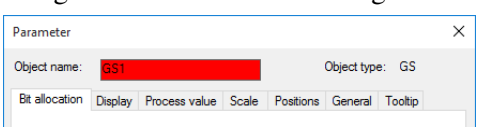
All objects used inside this object will be moved and sized accordingly.

3.5.4 General parameters for dynamic graphic objects

Six tabs are provided in the parameter dialog for the dynamic graphic objects **Bar graph, Fill area, Alphanumeric display, Selection field, Graphic symbol** and **Self-animated object**; they are described here for all objects.

The parameter definition dialogs of the dynam. graphic objects **Button**, **Button field**, **Radio button**, **Trend window** and **Tab control** are each described separately.

The general section of the dialog shows both the object name and the object type.



Dynamic graphic.png

Object name Shows the name of the dynamic graphic object.

Object type Shows the type of graphic object

BG = Bar Graph
FA = Fill Area
AD = Alphanumeric Display
SA = Self-Animated Object
GS = Graphic Symbol
CUO = Trend Window
SEL = Selection Field,
BUT = Button
BTF = Button Field,
BTR = Radio Button
TC = Tab Control

Process value tab

Details of the process variables that are to be displayed with this graphic object. Definition of the display of this object in the graphic editor.

Scale tab

The area to be displayed is defined for an animation with an analog value. The limits are specified either by constants or by other process variables.

For bar graphs and fill areas, the fill direction and position of the reference line are defined.

Bit allocation tab

A dynamic object may have up to 3 dynamic process states assigned to it. These binary values are linked in Freelance Operations bit-wise, so that the object can be displayed in up to 8 states.

There are two options for defining a binary process state:

- Any process value whose data type is BOOL
- Existing messages

Display tab

Up to 8 object display states are defined for Freelance Operations, corresponding to the binary process values.

General tab

Static objects can be configured specifically as foreground or background objects for the dynamic object.

When a dynamic object in Freelance Operations is clicked on, this can also be used to trigger an action, for example, a change of display or the writing of a process variable.

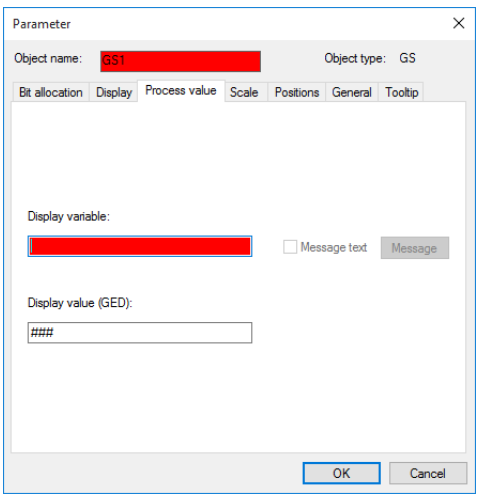
Positions tab (only for graphic symbol)

A graphic symbol can be either moved continuously across an area in the graphic display or displayed at up to 8 chosen positions in the graphic display. This area or these positions are defined on this tab.

Tooltip tab

With this tab tool tips can be configured for the dynamic objects. Depending on the respective object, there are various tooltip possibilities which are available.

3.5.5 Process value tab



Process value.png

Display variable

Enter the name of a process variable or select it from the list through **F2** key.

Message text ☑ In place of a process value, the specified text of a message will be displayed.
Checking this box will make the **Message** button available. The input field will be colored gray and the text <*Message text*> displayed (only available with **alphanumeric display** graphic objects).

Message Choice of the message point, the text of which is to be displayed in the alphanumeric display (only available with **alphanumeric display** graphic objects).

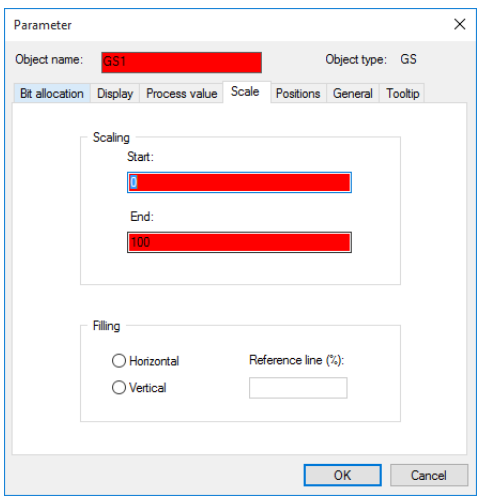
Display value (GED)

On quitting the parameters dialog, the graphic object is displayed

on the screen as it is to appear with the value specified. An arrow in the graphic object indicates that the scaling has been violated.

3.5.6 Scale tab

The scaling of the display, the fill direction and the position of the reference line are specified in this parameter dialog.



Scale.png

Scaling

Start/End The display range (0 – 100%) can either be specified by giving a constant or as a variable name (selection list available with **F2**).

Filling

Horizontal/Vertical

Direction in which the dynamic graphic object is to be filled.

Reference line **(%)**

The reference line of the bar graph is given in percent; it defines the value 0 in the bar graph drawing area or the fill area.

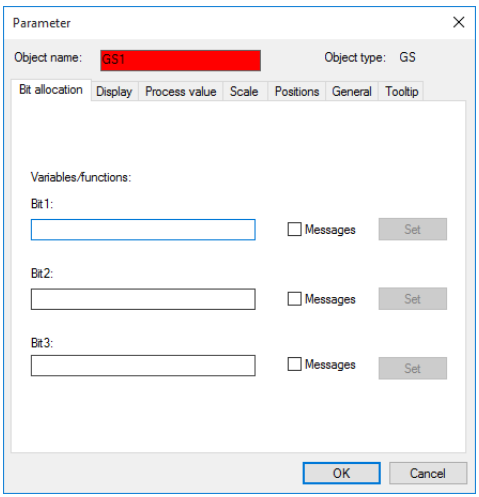
3.5.7 Bit allocation tab

Dynamic objects of type **bar graph**, **alphanumeric display**, **fill area** and **graphic symbol** may have up to 3 dynamic process states assigned to them. These binary

values are linked in Freelance Operations bit-wise, so that the object can be displayed in up to 8 states.

There are two options for defining a binary process state:

- Any process value whose data type is BOOL
- Existing messages



Bit allocation.png

Variables/functions

Bit1, Bit2, Bit3

Either a process variable or a set of message points with a select function can be assigned to each of three bit variables. The number of bit variables configured will determine the number of graphic object states that need to be specified.
1 Bit-Variable = 2 states of the dynamic object have to be specified.
2 Bit-Variables = 4 states of the dynamic object have to be specified.
3 Bit-Variables = 8 states of the dynamic object have to be specified.

Data input field

Depends on the state of the ***Messages*** check box*:*
The binary process state is defined by a variable of type BOOL.

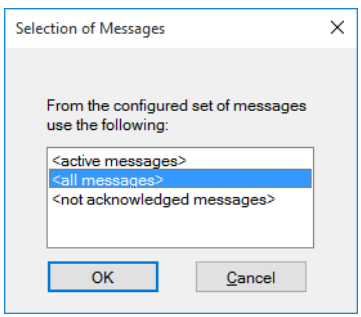
Enter the name of a process variable or select it from the list through **F2** key.

or — The binary process state is defined by a set of message points. The **F2** key opens a dialog for selecting a message function.

Messages — ☑ A set of message points is used to define a binary process state. If the check box is selected, the Set button becomes available, and the text ***<all messages>*** is displayed.

Set — Choose a set of message points from among all existing message points in the project.

After pressing the **F2** key in an input field for a bit variable with messages, an additional dialog box appears. The choice made there determines which message status will be used for evaluation.



Message.png

<active messages>

From the set of configured messages, those whose message state is 'active' are evaluated.

<all messages>

From the set of configured messages, those whose message state is not 'inactive, acknowledged' are not evaluated, that is, all active messages and all the inactive, unacknowledged messages.

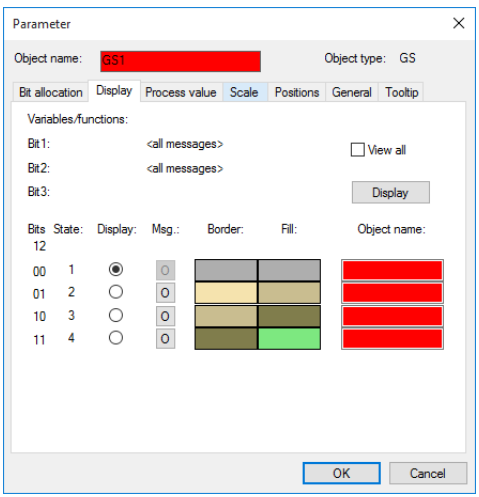
<not acknowledged messages>

From the set of configured messages, those whose message state is 'unacknowledged' are evaluated.

3.5.8 Display tab

Animation of a graphic object with binary process states means that the graphic object will be displayed with changing graphic attributes. In addition to specifying pre-set colors, it is possible to configure an object to take on the color of a message. The message color is determined by the message priority.

It is first determined which of a set of messages are active or pending. Then with the function **most important message, latest message, oldest message** or **highest priority message** exactly one message is singled out. Both the foreground and background color of this message, each with or without acknowledgment information, can be used for displaying the object. In Freelance Operations, the process of singling out a message and updating the graphic object with the current colors of that message is repeated once per update cycle.



Display.png

Variable/Function

Bit1, Bit2, Bit3

Display the configured bit variables and functions.

Table

Bits Displays the possible bit combinations of the binary variables.

State Numbering of the states available for the graphic object.

Display ◉ On quitting the parameters dialog, the dynamic object is displayed with the attributes of the selected line in the graphic display.

Msg. This button is available when the state of the graphic object is determined by messages. When it is selected, a dialog appears in which a message can be singled out.

Border/Fill

Click mouse on the required color field or press **Tab** key repeatedly until focus is on the required color field, then press **Spacebar**.
It is possible to change the border and fill color settings for the dynamic graphic object. The setting of the required color is made out with the color selection parameter window Color selection (see Color selection on page 87). With the setting *invisible*, the border or area is displayed transparent, with *Original colors*, the colors of the static graphic object are used.
If the state of the graphic object is influenced by messages, then, in the second color dialog (Message colors) the object can be configured to take on colors from the messages it depends on (see below).

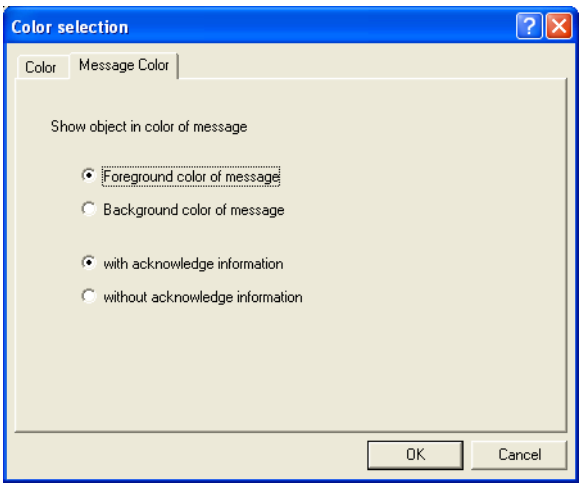
Display Switch to the graphic display (operative only with certain dynamic graphic objects).

Object name > Click field > Press **F2**,
> Names of the static graphic objects that are not yet in use are output,
> Select and **OK**,
> Name of selected graphic object is shown in this field.

or

> Click the required field under *Object name*
> Use the **Display** button to change to the graphic display,
> Select existing or newly created static graphic object which is not yet in use
> Return to parameter definition through > **Edit** > **Return to object**
> Name of the graphic object is entered in the field (If a static graphic object without a specified name has been selected, this object is automatically assigned a system-generated name).

Assignment of a message color to a dynamic graphic object



tu0506us.bmp

Foreground color of message
Background color of message

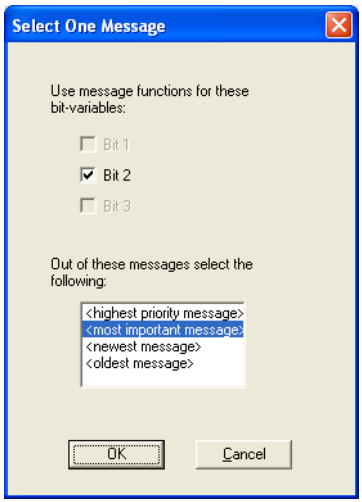
The color, determined by the priority of the selected message, is used in displaying the graphic object.

with acknowledge information
without acknowledge information

The graphic object will be displayed with blinking or static message color.

Singling out a message from among the set(s) of configured messages:

After pressing a **Msg** button in the color table, the following dialog comes up. At run-time, exactly one message must be singled out in order, for example, to determine the color of a dynamic graphic object.



tu0507.bmp

In the upper portion of the dialog it is determined, which sets of the specified message points are to be used.

In the lower portion of the dialog are the specifications as to which of these messages is to determine the current object color.

most important message

The most important message is determined using the following algorithm:

Criterion A: Message status	
Step 1	Active, not acknowledged
Step 2	Not active, not acknowledged
Step 3	Active, acknowledged

All messages being equally important according to Criterion A are sorted according to:

Criterion B: priority	
Step 1	System messages S1..S3
Step 2	Messages with priority 1
Step 3	Messages with priority 2
Step 4	Messages with priority 3
Step 5	Messages with priority 4
Step 6	Messages with priority 5

All messages being equally important according to Criteria A and B are sorted according to:

Criterion C: Acknowledgment strategy	
Step 1	Acknowledgment strategy 1
Step 2	Acknowledgment strategy 2
Step 3	Acknowledgment strategy 3

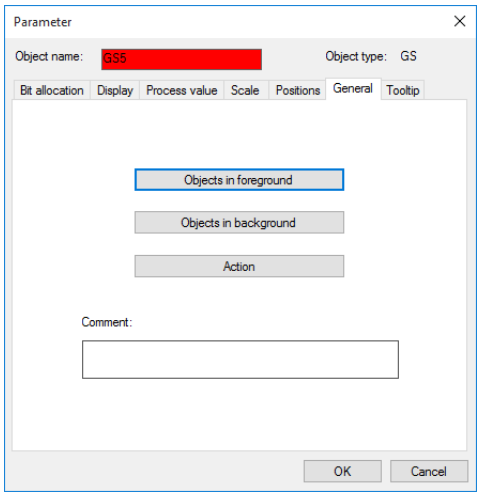
From all messages being equally important according to Criteria A, B, and C the oldest message will be determined.

highest priority message
The message with the highest priority. If more than one message with the same priority exists, the ‘most important’ will be determined.

newest message The message with the most recent time stamp. If more than one message with the same priority exists, the ‘most important’ will be determined.

oldest message The message with the time stamp furthest in the past. If more than one message with the same priority exists, the ‘most important’ will be determined.

3.5.9 General tab



General.png

Objects in foreground / background

Overlapping of static and dynamic graphic objects. Static graphic objects can be placed in front of or behind dynamic objects. After pressing one of these two buttons, the corresponding graphic level is activated. Static graphic objects can be selected or created at that level. Return to the parameters dialog through > **Edit** > **Return to object**. After completion of parameter definition, the edited graphic objects are *grouped*, connected with each other (share a common frame).

Grouped graphic objects can be ungrouped as follows:

> Select dynamic object, > **Animate** > **Reedit**
> Select **Objects in foreground** or **Objects on background**, graphic level is activated,
> Click on an unoccupied area (no item should be selected),
> **Return to object**.

The connection between the dynamic and static objects is removed.

Action	When a dynamic graphic object is selected in Freelance Operations, an action such as a display change, calling up a tag allocation faceplate, operation of a variable or acknowledgment of a message can be made to occur. It is also possible to operate a variable or acknowledge messages. See following chapter for details on how such an action is configured.
Comment	Free-form text can be entered to describe the graphic object (maximum 33 characters).

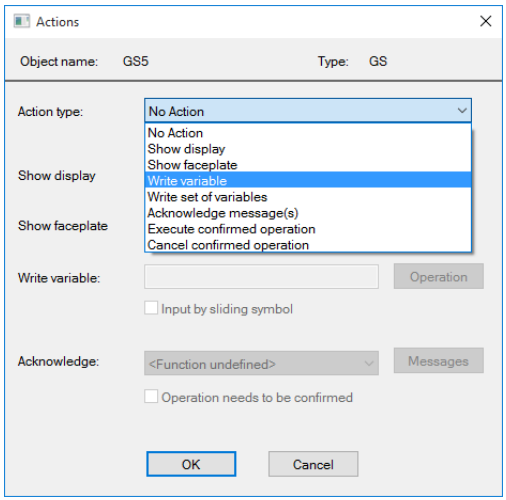
3.5.10 Configuring an action

An action can be specified for all dynamic graphic object types except **trend window**. In Freelance Operations, this action will be triggered by a click on the object. An exception is to open a tag allocation faceplate: the tag is selected with a click and the associated faceplate is opened with a double-click.

One of the following actions can be configured for any dynamic graphic object:

- No action: No action will be performed in Freelance Operations.
- Show display: The configured display will be opened in Freelance Operations.
- Show faceplate: The faceplate of the configured tag will be opened.
- Write variable: Depending on the configuration, the operator can enter a value or a fixed value will be written to the configured variable in the process station.
- Write set of variables: Same as Write variable, but a list of variables will be written with one write command to the process station.
- Acknowledge message(s): An acknowledge command will be written to all configured messages.
- Execute confirmed operation: An operation that has to be accepted pressing the **OK** or ENTER key, can be ended by selecting this action. All pending actions will be executed. If this action is selected, the graphic object will receive the function of an ENTER key.
- Cancel confirmed operation: An operation that has to be accepted by pressing the **OK** or ENTER key, can be aborted by selecting this action. All pending actions will be canceled. If this action is selected, the graphic object will receive the function of an ESC key.

> Press the button **Action** in the parameter definition dialog



Actions.png

For the configuration of actions, the drawing order of the graphic elements is important. If the graphic area in Freelance Operations is clicked, the action of the topmost object will be processed; the action of a lowermost object will not be accessible.

After selecting an *Action type* only the fields associated with the respective action remain accessible. An entry can be made directly or through the selection list by pressing the **F2** key.

Action type	Selects an action type to be configured
Show display	When the graphic object is selected in Freelance Operations, the display entered here will be called up.
Show facplate	When the graphic object is selected in Freelance Operations, the faceplate associated with the tag entered here will be called up.
Write variable	When the graphic object is selected in Freelance Operations, the current value of *Value* will be written to the variable entered here. Entering the name of a variable in this field enables the operator action in Freelance Operations. If the action is configured for a

graphic symbol, the check box **Input by sliding symbol** will be enabled additionally. See Write variable operation on page 117.If the action type Write set of variables is selected, this field shows the entry <set of variables>. The variable set will be configured through the **Operation** button. For details, see Write set of variables operation on page 124.

Acknowledge Selecting the action *Acknowledge message(s)* enables the button **Messages** and the check box **Operation needs to be confirmed** in the field acknowledgment. See Selection of messages on page 128.

☑ *Operation needs to be confirmed*: If this check box is marked, an acknowledgment by the operator will be required.

3.5.11 Write variable operation

After a process variable is specified for writing to by a Freelance Operations operation action, the type of operation and associated operations log entry format must be specified. The value to be written to the variable is either fixed as a configuration setting or to be entered by the Freelance Operations user.

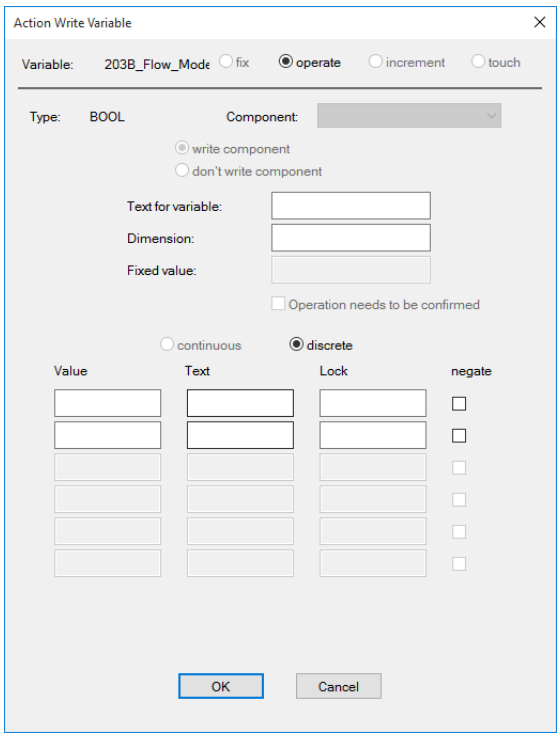
Values for structured variables can also be obtained through a graphic display. The operation of each component of a structured variable is configured separately. In Freelance Operations the operation of the components is carried out one after another. Not all components need participate in the operation procedure.

After a graphic object is selected in Freelance Operations, an operation dialog is displayed next to the object. When the operation dialog is called up, the current value of the process variable to operate is read and displayed as default value. The component values can be changed individually and then transmitted to the process station by a write command.

Only one operation procedure can be configured per graphic display for a given process variable. It is not possible, for example, to configure one graphic object with an input field and another graphic object with discrete values. It is possible, however, to configure a variable to receive a value from the user through one graphic object and to receive a fixed value through another graphic object.

The dialog which appears when **Operation** is chosen for configuring the writing to a process variable, depends on the data type of the variable.

Configuration for operating a variable



Write variables.png

Variable Shows the name of the associated process variable.

fix/operate Choose whether the variable is to receive a fixed value or a value obtained from the user. If *fix* is selected, entries may be made in the *Text for variable, Dimension, Fixed value* and *Lock* fields.

increment This option allows for incremental process value changes. The step width changes while the button is being pressed. For configuration see Configuring operation: Increment on page 120.

touch A configured value is written while the button is being pressed. For configuration see Configuring operation: Touch on page 122.

Type Shows the data type of the variable.

Component For structured data types only.
One element of the structured variable is selected at a time from the

selection list. The operation of each component is configured separately. In Freelance Operations the operation of the components is carried out one after another.

write/don't write component
For structured data types only.
Whether or not it shall be possible to operate a component in Freelance Operations is specified here for each component.

Text for variable
Input any text.
This text is entered as the variable name in the operation log.

Dimension Input any text.
In the operation log this text is entered after the old and new values.

Fixed value Input is only possible here if *fix* operation has been chosen. This value is directly written to the process station, without requiring any further entries from the Freelance Operations user.

Operation needs to be confirmed
an only be selected together with the Fixed value edit field.
The changed process value is calculated on the basis of the absolute value or as a percentage of the scaling.
☑ The value configured as *Fixed value* is only written to the process station if, after having clicked the object with the mouse, you additionally actuate the **ENTER** button or an **OK** button in the graphic display.
☐ The value configured under *Fixed value* is directly written into the process station upon a mouse-click on the object in Freelance Operations.

continuous In Freelance Operations the value to be written is either entered graphically by using the mouse, or numerically by entering a value into the input field.

discrete For entering a value, up to six alternative options are displayed.

Min/Max Validity range for entered value.

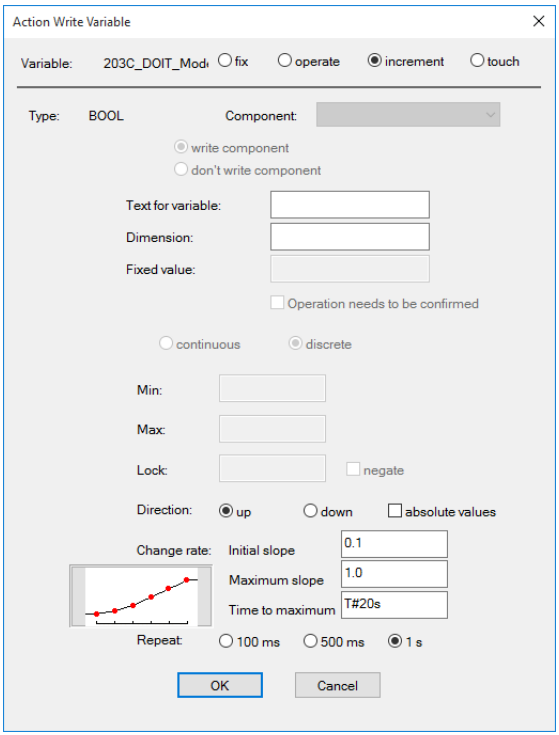
Lock The operation of a value can be locked in conjunction with a BOOLEAN variable. When the operation menu is called up, this

variable is first read and operation refused if it has the value TRUE. Also, writing a fixed value can be prevented by the configuration of a *Lock* variable.

negate The value of the variable defined in *Lock* is negated for the purposes of locking out operation, i.e. to lock out operation, the variable must have the value FALSE.

Configuring operation: Increment

This option allows for incremental process value changes. When selecting an object, the associated process value is increased or decreased within its scaling by the calculated difference. This new value is directly transmitted to the process, that is, no further confirmation is required. Continuous pressing of this button - that is, holding down the mouse button for a longer time period - permanently repeats this procedure. With this, the process value is changed continuously and not in a single step as it would after entering a new value. The step width changes with the time for which the button is held down.



Increment.png

Direction Direction of the progression of values (up/down). The current process value is incremented or decremented, depending on the configured parameter setting.

absolute values

The changed process value is calculated on the basis of the absolute value or as a percentage of the scaling.

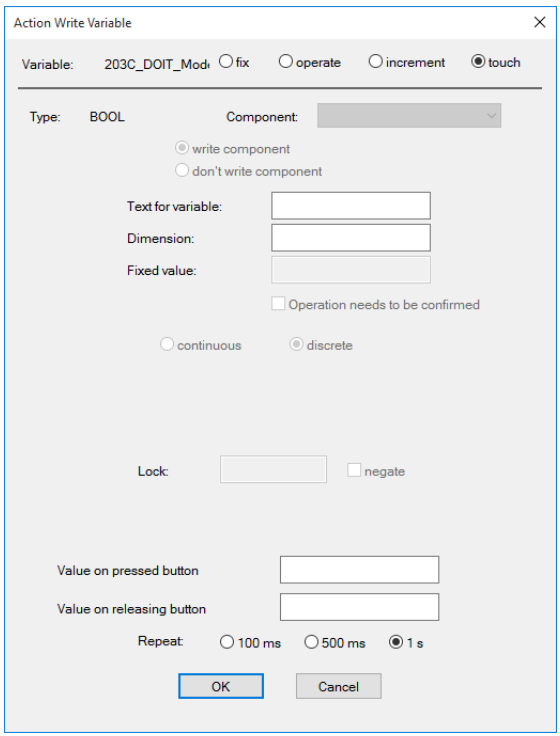
☑ Calculate process value changes in absolute values.

☐ Calculate process values changes as percentage values of the scale.

Change rate The longer the button is held down, the more the process value may change. With the values for *Initial slope*, *Maximum slope* and *Time to maximum* the curve to be used for this calculation is specified.

Repeat Frequency with which a new value is calculated and written to the process station (100 ms, 500 ms, 1 s).

Configuring operation: Touch



Touch.png

Value on pressed button

Entry of a constant value which is written as long as the button is pressed (that is, while holding the mouse button down).

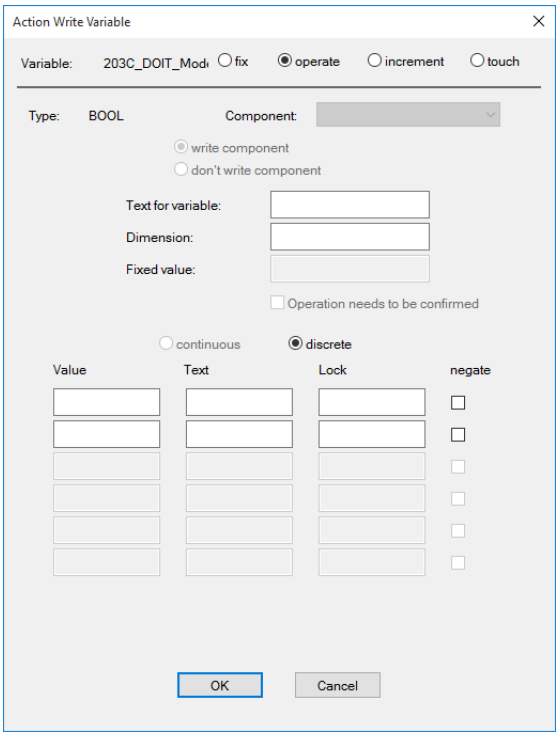
Value on releasing button

Entry of a second constant value (optional), which is written once when the button is released.

Repeat Frequency with which a new value is calculated and written to the process station (100 ms, 500 ms, 1 s).

Configuring operation: Discrete

When selecting *discrete* instead of *continuous* a choice of up to 6 fixed values can be offered to the Freelance Operations user for selection.



Discrete.png

Value Value (must be compatible with data type of the variable to be operated). When invoking the operation dialog, the variable to be written is read and the text associated with the value is selected. When Freelance Operations initiates the write action, the value that was configured for the selected text will be written to the variable.

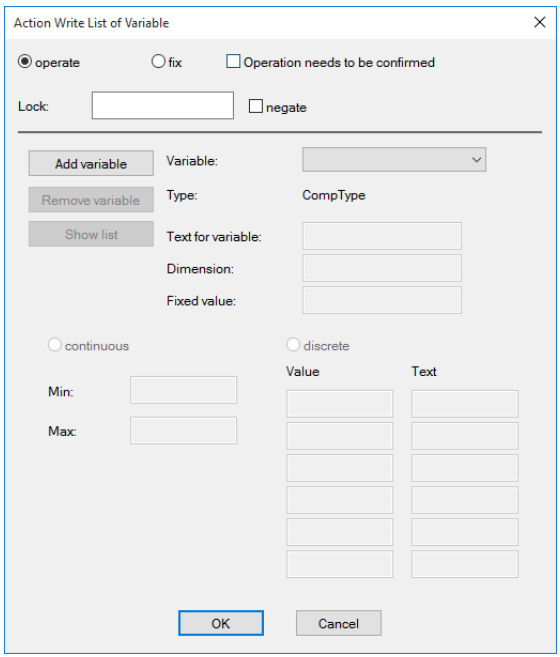
Text Input any text.
The text is displayed to the user, and the corresponding value is entered in the operation log.

Lock The availability of every individual value can be locked, in dependence of a BOOLEAN variable. When the operation menu is invoked, this variable is read, and the value is not shown or indicated as not available, if this variable has the value of **TRUE**.

negate The value of the variable defined in **Lock** is negated for the purposes of locking out operation of a radio button, that is, to lock

out operation of the radio button, the variable must have a value of **FALSE**.

3.5.12 Write set of variables operation



Write set variables.png

Unlimited global variables can be selected for the **Write set of variables** operation. The variables are configured similar to the configuration for writing a single variable. Name, unit, value, input range, continuous or discrete operation are provided.

For the whole list, it must be configured whether the fixed or operated values will be written out of the Graphic display at Freelance Operations or whether the values are defined by the operator.

For operated values, the operator must provide the values one by one, similar to the operation for a structured variable. After this all values are sent together with one command to the process station.

This kind of operation is necessary for writing HART parameters. Within the HART devices one write command will always write the complete list with all parameters.

If the action type Write set of variables is used for writing HART parameters out of a graphic display, the configuration must take care that all HART parameters are provided in the list.

Writing an incomplete list of HART parameters may lead to an unspecific behavior of the device.

Add variable All variables and I/O components of the project are shown in the Select variable/component dialog. Any variable can be selected and will be added to the list of variables to be written.

Remove variable
The variable that is currently displayed in the *Variable* field will be deleted from the list.

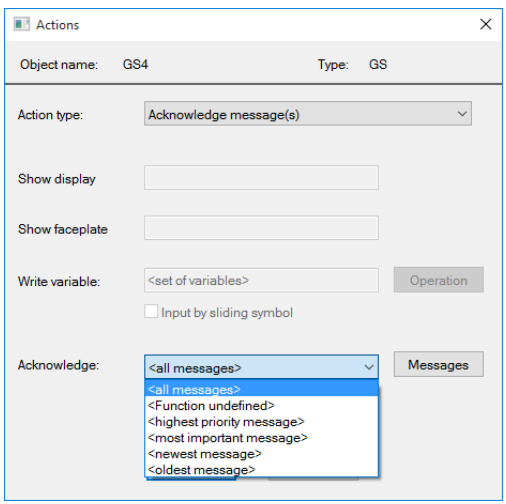
Show list Displays the list of variables configured.

Variable To select the variables from the drop down list to configure the variable properties.

3.5.13 Acknowledgment of messages

Freelance Operations can be made to acknowledge messages when an object is selected.

It is possible to so configure a dynamic object, that when it is selected in Freelance Operations, messages which are not visible in the display will be acknowledged.



Acknowledgement.png

Acknowledgment messages are only sent to message points for which an entry in the message page is available. Which of the specified message points are to be acknowledged when the graphic object is selected, must be specified with the acknowledgment function.

From all message points configured under **Messages** are acknowledged:

all messages all message points.

most important message

The most important unacknowledged message is determined using the following algorithm:

Criterion A: Message status	
Step 1	Active, not acknowledged
Step 2	Not active, not acknowledged
Step 3	Active, acknowledged

All messages being equally important according to Criterion A are sorted according to:

Criterion B: priority	
Step 1	System messages S1..S3
Step 2	Messages with priority 1
Step 3	Messages with priority 2
Step 4	Messages with priority 3
Step 5	Messages with priority 4
Step 6	Messages with priority 5

All messages being equally important according to Criteria A and B are sorted according to:

Criterion C: Acknowledgment strategy	
Step 1	Acknowledgment strategy 1
Step 2	Acknowledgment strategy 2
Step 3	Acknowledgment strategy 3

From all messages being equally important according to Criteria A, B, and C the oldest message will be determined.

highest priority message

The message with the highest priority. If more than one message with the same priority exists, the ‘most important’ will be determined.

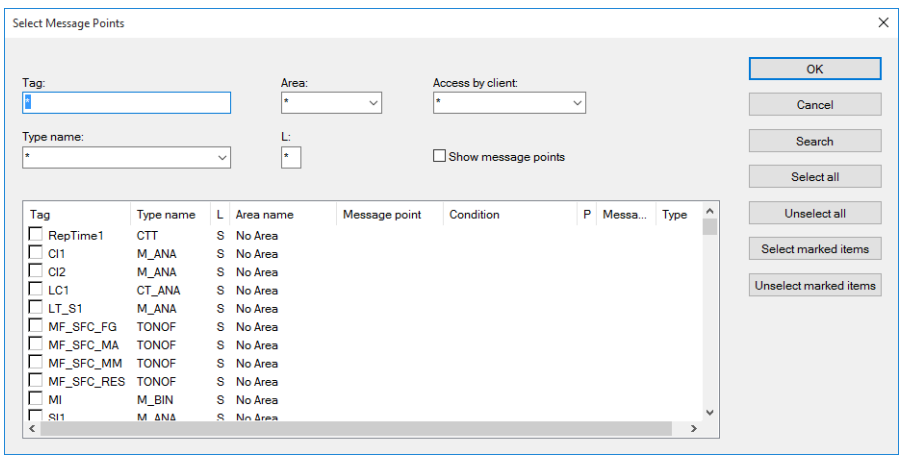
newest message

The message with the most recent time stamp. If more than one message with the same priority exists, the ‘most important’ will be determined.

oldest message

The unacknowledged message with the time stamp furthest in the past. If more than one message with the same priority exists, the ‘most important’ will be determined.

3.5.14 Selection of messages



Select message.png

All allocated tags in the project that have a faceplate and at least one message point are listed. Using the buttons in the column headings, the list can be sorted by different entries. Search criteria can be entered in the input fields above the list (see ***Engineering Manual IEC 61131-3 Programming***, ***Tags***).

Each line in the list is provided with a checkbox in which to mark the chosen message points.

Search criteria input fields:

Tag	Tag name
Area	Plant area
Access by client	The name of a gateway or Operator station can be given as a search criterion, that is, only the tags available on this station are listed.
Type name	Function block type
L	Library type
Show message points	Every message point of the listed tag is shown on a line of its own.

Column labels:

Tag	Tag name
Type name	Function block type
L	Type of library (S: Standard, U: User defined, E: Special)
Plant area	Plant area
Message point	Message points
P	Message priority
Message	Configured message text
Type	Message type
Search	The list is redrawn, taking any entries in the search criteria fields into account.
Select all	All message points in the list are selected. The selections remain even after entry of new search criteria provides a new list of message points.
Unselect All	The selection of **all** message points is undone. This procedure is independent of the search criteria in effect and the contents of the displayed list.

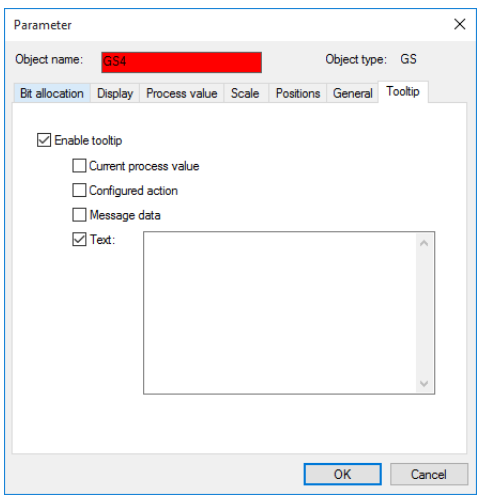
Select marked items

All message points with marked check boxes are selected.

Unselect marked items

All message points with marked check boxes are unselected.

3.5.15 Tooltip tab



Tooltip.png

Enable tooltip

If you select this check box, the subsequent check boxes will be enabled. If several tooltip variants are configured, these tooltip variants will be indicated one below the other in a tooltip in Freelance Operations.

Current process value

In Freelance Operations the name of the display variable and the current process value are indicated in the tooltip:
Value *(<Name>): <current value>*

Configured action

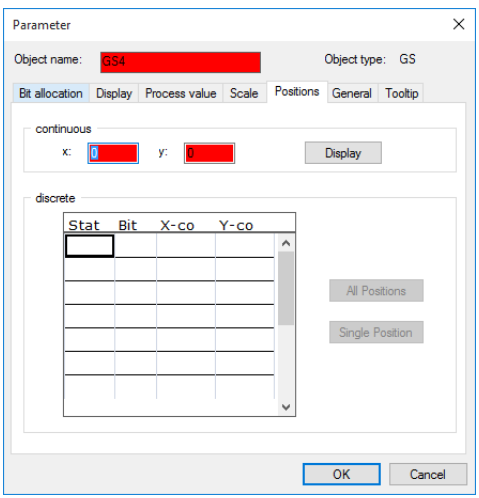
The action triggered by clicking on the object, will be indicated as a tooltip:
Load Display <Name>
Open Faceplate <Name>

Write Variable <Name>
Acknowledge Message (s)
Accept Operation
Cancel Operation

Message data In the tooltip the message information is given which is used to display the object.

Text In the input field you may enter any text of several lines which will appear in the same format in the tooltip.

3.5.16 Positions tab (only for graphic symbol)



Position tab.png

continuous

x-, y- coordinates

Enter the x/y coordinates of maximum movement. The movement range is produced from the process variable and the scaling.
The movement vector set determines the movement of the graphic symbol when the value of the variable is equal to the end of the scale. When the variable value is equal to the start of the scale, the graphic symbol is displayed in the design position.

> Click on *x*- or *y*- field, > switch to the graphic display through the **Display** button,
> Determine position with cursor.

Display Switch to the graphic display,
Return through > automatical return to the parameter definition by double-clicking.

discrete

All positions Enter all positions

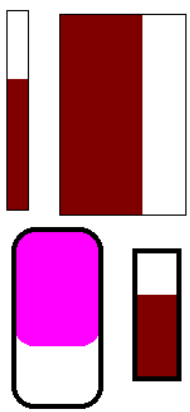
> Switch to the graphic display through the **All positions** button,
> Click positions, > **Automatic return** to the parameter screen,
> Coordinates are entered.

Single position Enter a single position

> Select *x*- or y- field, > Enter the x/y-position or
> Switch to the graphic display through the **Single position** button,
> Click on required position
> automatic return to the parameter screen
> Coordinates are entered.

3.5.17 Bar graph

> Animate > **Bar graph**
> A mouse-click fixes the position of the top left-hand corner; by dragging the mouse (rectangle), the size of the bar graph can be adjusted. Another click of the mouse at this point concludes the construction of the bar graph,
> Enter data in the parameter definition dialogs,
> Display the bar graph without construction frame.



A current process value can be displayed as a rectangular column. The minimum and maximum values of the column can be given as constants or as other process values. The column can be filled vertically or horizontally. The reference line of the bar graph is given in percent; it defines the value 0 in the bargraph draw area.

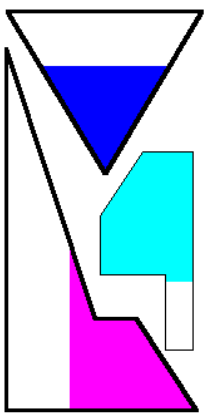
The line style, line width, pattern and colors for the background are defined with > **Change** > **Line attributes/ Area attributes** or through the toolbox with the **Line** or **Area** buttons

The color settings for the border and the areas are made in the color table parameter windows (see Display tab on page 109). The colors can be made to change as a function of binary variables and/or messages.

For configuration see General tab on page 114, Process value tab on page 105, Scale tab on page 106, Bit allocation tab on page 106, Display tab on page 109.Tooltip tab on page 130

3.5.18 Fill area

> **Animate** > **Fill area**, > entries in the parameter definition dialog,
> From the **Display** dialog go to the graphic display by pressing the **Display button**
> Select an existing polygon or create a new one > **Edit** > **Back to the Object** > **OK**.



A fill area is linked to a polygon. The area bounded by the polygon is filled in dependence of the current process value. Minimum and maximum values associated with the fill area are set as constants or configured as other process values. The area can be filled vertically or horizontally. The fill area reference line is given in percent.

The line style, line width, pattern and colors for the background are defined with > **Change** > **Line attributes/Area attributes** or through the **toolbox** with the **Line** or **Area** buttons

The color settings for the borders and the flooded area are made in the color selection parameter dialog (see Display tab on page 109). The colors can be made to change as a function of binary variables and/or messages.

The static object polygon can no longer be selected individually, but only as a fill area. Assigning a different polygon to a given fill area makes the previously assigned polygon available again as static graphic object.

For configuration see Process value tab on page 105, Scale tab on page 106, Bit allocation tab on page 106, Display tab on page 109, General tab on page 114, Tooltip tab on page 130.

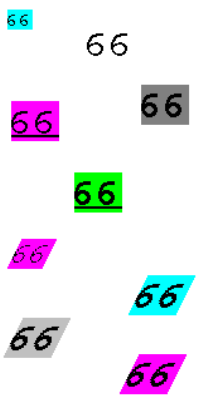
Description of parameters specific to fill areas

Display options

Display The switch to the graphic display is compulsory. An existing polygon can be selected or a new one created. Return to the parameter definition dialog through > **Edit** > **Return to object**.

3.5.19 Alphanumeric display

> Animate > **Alphanumeric display**
> A mouse-click fixes the position of the top left-hand corner and, by dragging the mouse (rectangle), the size of the alphanumeric display can be adjusted. Another click of the mouse at this point concludes the construction of the alphanumeric display,
> Enter data in the parameter definition dialog,
> Display the text without construction frame.



The current contents of a process value will be displayed either numerically or as text in any required format. All system data types can be represented.

Even the display of a configured message can be realized with an alphanumeric display.

The size, alignment and the fix point can be set with > **Change** > **Text attributes** or through the **Toolbox** with the **Line** or **Field** button.

The color settings for texts and background are made in the color selection parameter window (see Display tab on page 109). The colors can be made to change as a function of binary variables and/or messages.

For configuration see Tooltip tab on page 130, Process value tab on page 105, Bit allocation tab on page 106, Display tab on page 109, General tab on page 114.

Description of parameters specific to alphanumeric displays

Display

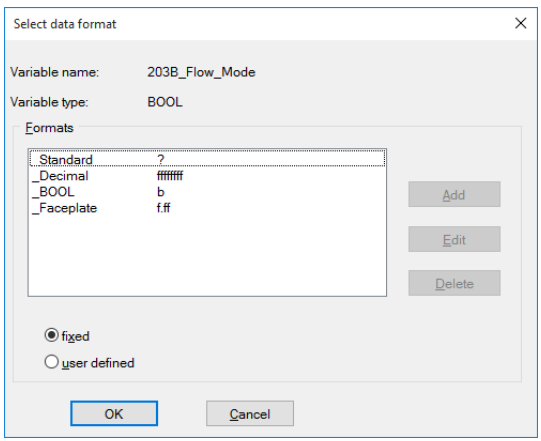
Format A separate format can be specified for each of the up to 8 states that the alphanumeric display can assume.

> Click on format area > Press **F2** > Select format > **OK**

A window is opened, and the various output formats are indicated for selection, including formats conforming to the IEC Standard. Custom formats can also be created.

Select and create custom formats

After selecting the table column *Format* on the **Display** tab and pressing **F2**, the **Select data format** dialog shows the standard default data formats for the relevant data type. The required format can be selected, then accepted with **OK**.



Select data format.png

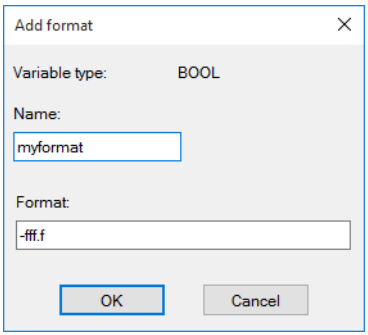
Format

fixed ◉ Default format for the data type; the **Add**, **Edit** and **Delete** buttons cannot be selected.

user-defined

◉ Display user-defined formats; the **Add**, **Edit** and **Delete** buttons are selectable.

With the settings *fixed* and *user defined* you can switch between the format displays. In the user defined display mode, a new format can be specified using the **Add** button. A selected format can be deleted with the **Delete** button or opened through the **Edit** button and changed in another window.



Add format.png

Name Name of the new format

Format Required formatting. In the **Format** field you can enter the letter *f* for the required format, for example, ff.ffff for two digits to the left and four digits to the right of the decimal point.
'-' serves as a wild card for negative numbers, and a display with a leading sign is indicated by '+'.

OK Adds the new format to the existing format list.

Examples of fixed data formats:

The **Standard** format is available for each data type, see table:

The following applies to the representation of Real numbers: Due to internal representation constraints, conversion of real numbers to displayable values cannot be made to more than 7 significant digits. Because of this fact, in the standard format, the number of decimal places is adjusted as a function of the numeric value. Very large and very small values are displayed in exponential notation.

Data type	Name	Format	Example
REAL	Float	+f.ffffffE+ee	-4.670000E-19
	Fixed point 1	f.f	3.1
	Fixed point 4	f.fff	3.1415
BOOL	BOOL (= Standard)	b	TRUE
	Decimal	+fff	1

Data type	Name	Format	Example
INT, UINT, DINT, UDINT	Binary	2#ffffff	2#101010
BYTE, WORD, DWORD	Octal	8#ffffff	8#605301
	Decimal (= Standard)	+fff	–145
	Hexadecimal	16#ffff	#16#F90C
TIME	Duration (= Standard)	T#fhffmffsffms	T#1h35m50s8ms
	hh:mm:ss.sss	hh:mm:ss.sss	15:36:55:041
	hh:mmm	hh:mmm	15:36
	ss.sss	ss.sss	55.041
DT	Time of day (= Standard)	DT#yyyy-mm-dd-hh:mm:ss,sss	1998-09-15-14:36:55,041
	Summertime / wintertime (*)(1)	DT#yyyy-mm-dd-hh:mm:ss,sss a	1998-09-15-15:36:55,041S
	hh:mm:ss.sssa (*)	hh:mm:ss.sssa	15:36:55.041S
	hh:mm:ss.sss	hh:mm:ss.sss	14:36:55.041
	dd-mm-yy	dd-mm-yy	15-09-98
STRING	Pure string Pur	s:0:0:n,n	ABCDEFG12345
	String (= Standard)	s:0:0:y,y	‘ABCDEFG$N12345’

(1) If the time to be displayed is in summertime, the value is increased by the summertime differential and flagged with S, both in Freelance Operations and in the graphic editor).

Examples of user defined data formats:

Data type	Format	Example
REAL	[**+**|**-**|]**f.ff**...{**E**[**+**|**-**]**ee**}	3.141E+00, 3.0, –4.2, +6.2E-05
INT,UINT,DINT, UDINT	[**+**|**-**]**fff**...	35, 4000, +500
BYTE,WORD, DWORD	0f	07
TIME	see fixed data format	
DT	see fixed data format	
STRING types	**s:L**{**,S**}**:Z:I:T**(1) (2)	High, Low

(1) **Control characters:**
$R Carriage Return (CR),
$N Line Feed (LF),
$L Carriage Return and Line Feed corresp. RN,
$T Tabulator,
$ff Hex-coded ASCII character (e.g. '$41' synonymous with 'A'),
$' Apostrophe ('),
$$ Dollar sign ($).

(2) **Control characters for use with strings:**
L: Number of displayed characters. Default: all
S: Position of the first character to be displayed. 1. Character 1 occupies position 0. Default: 0.
Z: Line to be displayed, for all lines enter 0. Default: 0
I: Display of control characters and margin delimiters; Options y or n. Default: y
T: Interpret tab signs, options y or n. Default: n

Example:

Format	STRING variable	Output STRING variable
s:	'ABCDEFG$N12345'	'ABCDEFG$N12345'
s:11	'ABCDEFG$N12345'	'ABCDEFG$N
s:10,5	'ABCDEFG$N12345'	EFG$N1234
s::2	'ABCDEFG$N12345'	12345'
s:2,1	'ABCDEFG$N12345'	A

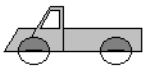
Format	STRING variable	Output STRING variable
s:2,1:2	‘ABCDEFG$N12345’	2
s:2,0:2	‘ABCDEFG$N12345’	1
s:::n	‘ABCDEFG$N12345’	ABCDEFG | | 12345

```
s:10    'ABCDEFG$N12345'
        :         :
        0         9
                    and one space    'ABCDEFG$
s:10,5 'ABCDEFG$N12345'
        :    ::        :
        0    4:        :
             5         :
             0        8
                    and one space    EFG$N1234
```

3.5.20 Graphic symbol

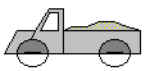
A graphic symbol is used to animate static graphic objects. As with the other dynamic objects, a maximum of 3 binary process states, and consequently eight different states can be configured for this object. Two colors and one static object are defined for each state. The static objects can be single objects or groups containing several objects (SGM). It is thus possible, for example, to display a line in a variety of different colors and also to select completely different representations for the various different states.

The following **Animate options** are available:



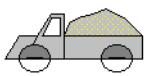
Do not move

The static elements of the graphic symbol are output on the defined xy coordinates. The coordinates are determined by positioning the graphic objects in the graphic display.



Discrete move

The pre-set coordinates at which the graphic symbol is displayed are a lookup function of binary variables (maximum 3). Customized colors can also be specified for the different states (maximum of 8).



Continuous move

The graphic symbol is moved continuously between two x/y coordinate points as a function of an analog signal. Up to 3 binary variables can also be set in order to define a maximum of 8 different color and display states for the graphic symbol.

When a graphic symbol is moved, all associated items are always moved together.

> Animate > **Graphic symbol**
> Fill in the parameter dialog,
> In the **Display** dialog select one of the object names and then the **Display** button,
> In the graphic display select a graphic object or object segment (SGM) or create a new one,
> Return to the parameter definition dialog through > **Edit** > **Return to object** > **OK**.

For configuration see Tooltip tab on page 130, General tab on page 114, Bit allocation tab on page 106, Display tab on page 109. Depending on the animation type see also Scale tab on page 106, Process value tab on page 105.

Color table

By configuring a maximum of 3 binary variables, the graphic symbol can be displayed in up to 8 states. For each of these states, a static graphic object and a color combination is specified (see also Display tab on page 109).

Object name > Click field > Press **F2**,
> Names of the static graphic objects not yet in use are output.
> Select and **OK**,
> Name of the selected graphic object is shown in this field.

or

> Click the required field under **Object name**
> Press the **Display** button to switch to the graphic display,
> Select existing or newly created static graphic object which is not yet in use
> Return to parameter definition through > **Edit** > **Return to object**
> Name of the graphic object is entered in the field (if a static graphic object without a specified name has been selected, a system-generated name will automatically be assigned to this object).

3.5.21 Self-animated object

> Animate > **Self-animated object**
> Fill in the parameter definition dialog,
> In the **Display** dialog select one of the object names and then the **Display** button,
> In the graphic display select a graphic object or object segment (SGM) or create a new one,
> Return to parameter definition dialog through > **Animate** > **Return to object**
> **OK**.

Up to 8 static graphic objects will be displayed in turn for 125 or 250 ms each.

When selecting an existing self-animated object, a construction frame is drawn around the displayed symbol. The symbol is displaceable. When a graphic symbol is displaced, all associated items are always displaced together.

If the *View all* check box is ticked in the **Display** parameter definition dialog, all the elements of the selected object that are being used will appear in the display, and - when selected - will be surrounded by a common construction frame.

For configuration see Tooltip tab on page 130, Bit allocation tab on page 106, Display tab on page 109, General tab on page 114.

Description of defining parameters specific to self-animated objects

The variables have different meanings in the **bit variables** dialog.

Visible/Invisible Depending on the value of a process variable, the graphic object is either shown or not shown in the graphic display sequence.

On/Off Depending on the value of a process variable the intermittent display of static objects is switched either on or off.

Fast/Slow The speed of animation is made to change with the value of a process variable.

Display

Up to 8 static objects and color combinations can be assigned to a self-animated object. Depending on the values of the specified process variables, the next object appears in the Graphic display every 125 or 250 ms, the animation is started or stopped, or the display of a given object is included or not.

If self-animated objects are used in a Graphic display, the appearance of text objects may be unclear.

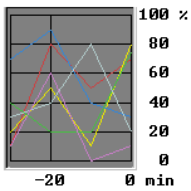
This problem can be solved by changing the display sequence of the objects in the Graphic editor. All self-animated objects are configured in the foreground of the other objects through.

Select **Self-animated graphic object > Edit > Overlap > Foreground**

3.5.22 Trend window

> **Animate > Trend window**,
> Upper left corner of the Trend window is positioned with a mouse click,
> Define Trend window size by moving the mouse, terminate by clicking mouse,
> Enter data in the parameter definition dialog,
> Display Trend window with a frame.

Display up to 6 trends within a trend window.



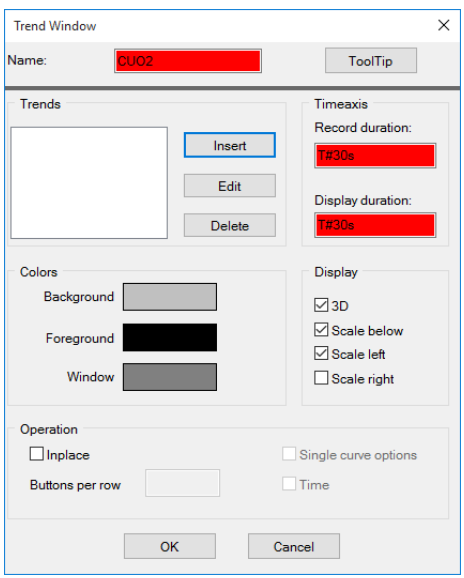
A Trend window can be positioned and sized within a graphic display. Up to 6 trends may be displayed in one window. These trends have no history, that is, display of the measured values commences when the corresponding graphic is called up. The color can be set separately for each trend, as it can for the Trend window foreground and background. Standard scaling is specified but can be changed within Freelance Operations.

The Trend window can be shown with or without 3-D formatting.

The trend data are captured according to the cycle time defined for the graphic. A maximum recording time can be set in TIME format.

The Trend window cannot be moved in Freelance Operations. No trends can be added in Freelance Operations.

Trend window parameters



Trend window.png

Tooltip After selecting the **Tooltip** button the **Activate Tooltip tab** appears. For the trend window only the check box *Text* is available.

Trends List of variables specified for display in the Trend window.

Insert On selecting the **Insert** button, the **Trend data** dialog appears, where the trend variable can be entered with its characteristics.

Edit On selecting a specified variable (click on variable under **Trends**) and pressing the **Edit** button, the **Trend data** dialog appears with the entries for that trend variable. The entries can be changed in this dialog box.

Delete On selecting a specified variable (click on variable under **Trends**) and pressing the **Delete** button, the variable is deleted from the Trend window.
The display of the scaling axis on the left is determined by the settings for the variable selected when exiting this dialog box.

Time axis

Record duration

Specify the maximum duration for which the trend can be captured without leaving this graphic display. Thereafter each new value overwrites the earliest value. Entry is in TIME format (maximum approximate value depends on cycle time of the display, for example, for a graphic display with cycle time of 1s the maximum duration of each trend window is about 2h15m).

Display duration

Specify the visible time range in the Trend window. Entry is in TIME format (maximum approximate 24 days).

Colors

Background Specify the background color of the Trend window.

Foreground Specify the foreground color (scaling, raster) of the Trend window.

Window Specify Trend area color for the Trend window. Click on color field and color selection through the **Color selection** parameter definition dialog (see Color selection on page 87), select color and confirm with **OK**.
Selected color is displayed in the color field.

Display Depiction of Trend window in the graphic display.

3D ☑ Trend window in 3-D formatting.
☐ Trend window without 3-D formatting.

Scale below

☑ The time axis is displayed under the trend window.
☐ Trend window displayed without time axis.

Scale left ☑ Scaling is displayed in physical dimensions to the left of the Trend window. The scaling values used are those which were configured for the variable selected in the trends list upon exiting this dialog box.
☐ Trend window without left scaling.

Scale right ☑ Scaling is displayed as percentage to the right of the trend window.
☐ Trend window without right scaling.

Operation Operation of the Trend window from within the graphic display.

Inplace ☑ Operation from within the graphic object.
☐ Operation from outside the graphic object.

Buttons per row

Indication of the visible trends per line.

Single curve options

☑ On the bottom part of the trend window on the left, a set of buttons is displayed to displace the Y axis of the marked trend.
☐ In the trend window there are no buttons for operation displayed.

Time ☑ On the bottom part of the trend window on the right a set of buttons is displayed to displace the X axis of the marked trend.
☐ In the trend window there are no buttons for operation displayed.

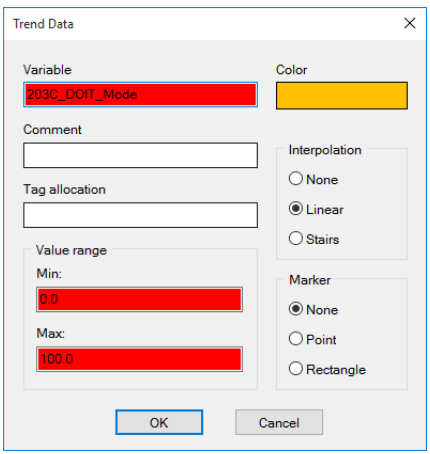
Trend window variables parametrization

Insert new Trend window variable

> Press the **Insert** button in the **Trend window** parameter definition dialog.

Change existing trend variable

> Select an existing variable,
> Press the **Edit** button in the **Trend window** parameter definition dialog,
> In the **Trend data** dialog, the variable can be configured.



Trend Data.png

Variable Enter trend variable. Enter directly or select through the **F2** key.

Comment A comment with up to 19 characters may be entered; it will be displayed to the left of the scaling and be visible only if *Scale left* is selected. Visible only if **Scaling left** has been checked off. (The size of the trend window within the graphic display is defined by the maximum length of the comments for all entered variables.)

Tag allocation Enter the name of a tag. It will be possible to open this tag directly in Freelance Operations through the Trend window. Enter the tag name directly or select through the **F2** key.

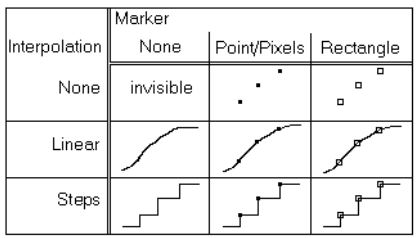
Value range

Min. Start of scale range in physical units.

Max. End of scale range, in physical units.

Color Specify trend color for the Trend window. Click on color field and color selection through the **Color Selection** parameter definition dialog (see Color selection on page 87), select color and confirm with **OK**. Selected color is displayed in the color field.

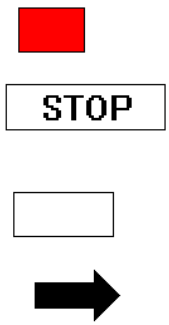
Interpolation	Specify trend depiction.
None	◉ No interpolation is performed,
Linear	◉ Trend is interpolated in a linear fashion,
Stairs	◉ Trend is depicted in discrete steps.
Marker	Specify depiction of individual measured values.
None	◉ Individual measured values are not marked,
Point/Pixels	◉ Individual measured values are marked with points,
Rectangle	◉ Individual measured values are marked with rectangles.



di0559uk.bmp

3.5.23 Selection area

> **Animate > Selection area**
> A mouse click fixes the position of the top left-hand corner and, by pulling the rectangle, the size of the selection area can be specified. Another click of the mouse at this point concludes the procedure,
> Enter data in the parameter definition dialog,
> Display the select field without frame.



A selection area enables tag faceplates to be called up in graphic displays. It is also possible to change over into another specific display (graphic, group display, trend,..) or to write a fixed or operated value to a process variable or to acknowledge messages. In case of selection the configured action will be carried out.

The field and the border of the selection area can be displayed visibly and colored or they can lie transparent underneath other graphic objects.

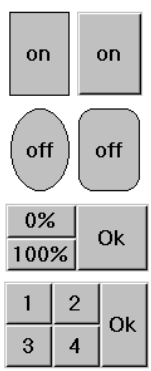
On selecting the select field in the graphic display, a frame appears. The select field can then be resized and moved.

For configuration see Tooltip tab on page 130, Display tab on page 109, General tab on page 114

3.5.24 Button, Button field, Radio button

> **Animate** > **Button** (or **Button field** or **Radio button**),
> Upper left corner of the button is positioned with a mouse click,
> Define button size by moving the mouse, terminate by clicking the mouse,
> Enter data in the parameter definition dialog,
> Display the button with a frame.

These buttons can cause displays or faceplates to be called up, variables to be set to preset numeric values, messages to be acknowledged or states to be displayed.



All the buttons, button fields and radio button fields can be displayed in a variety of different formats (rectangle, rectangle with rounded corners, 3D-rectangle, ellipse).

When a button is configured, either text can be specified for the button or any static graphic object can be defined as the button symbol. For each separate button, the text or button symbol, as well as the text and button colors are specified in the button/radio button configuration. The size, orientation and font for the text can be set or changed separately from the definition of button parameters using the text attribute settings.

A **button press** under Freelance Operations does not require any additional confirmation, and can write a process variable or open a faceplate or display. A button can be linked with any variable and displayed as either pushed or unpushed, as well as in different pairs of colors.

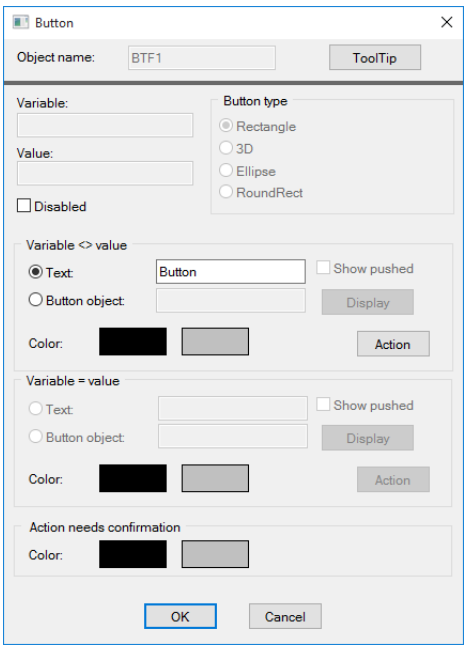
A **button field** consists of one or more buttons with an associated confirm button. When entering the parameters, the confirm button is always automatically displayed alongside. A button field can comprise up to 25 separate buttons. The buttons in a button field can be configured completely independently of one another. By pressing a button under Freelance Operations, a value can be entered or a faceplate or display called up. The action is not actually performed until the confirm button is pressed.

A **Radio button field** can comprise up to 25 buttons. All the keys in a **radio button field** are linked with the same process variable. A value for this variable can be preset for each key. When one of these keys is pressed under Freelance Operations, the value configured is written to the process variable. If the process variable is set to one of the configured values, this can be displayed on the corresponding key. With a radio button it is not possible to open faceplates or graphics and there is no confirm button.

Changing the text attributes of a button, button field or radio button:

> Select **button** (or **button field** or **radio button**),
> **Change** > **Text attributes** or through **Toolbox** text,
> Enter or change text displays
> Accept with **OK**,
> Button text appears as it was entered.

Set button parameters



Button.png

ToolTip After selecting the **ToolTip** button the **Activate Tooltip tab** appears. The only available check boxes for that button are *Configured action* and *Text*.

Variable The value of these variables will determine the text and color with which the button is displayed, as defined below.

Value Reference value for determining the display format: Variable <> Value or Variable = Value.

Button type Display format of the button in the graphic display.

- ◉ As a rectangle.
- ◉ As a 3D rectangle
- ◉ As an ellipse.
- ◉ As a rectangle with rounded corners.

Variable <> Value

When the variable shown has a value **different** from the reference

value, the button will be displayed with the *text* or *object*, *text color* and *button color* specified here.

Variable = Value

When the variable shown is the **same** as the reference value, the button will be displayed with the *text*, *text color* and *button color* specified here. Entries are not accepted here until a variable name and its reference value have been specified (**Variable, Value**).

Text/Button object

Determines whether button text or a graphic object is to be used for displaying the button, followed by:
Specification of the text to be shown on the button, or
The name of a static graphic object, either entered directly or selected after switching to the graphic display through the **Display** button.

Color Colors are selected for the border, button background and (if applicable) for the text through the parameter definition dialog (see Color selection on page 87).

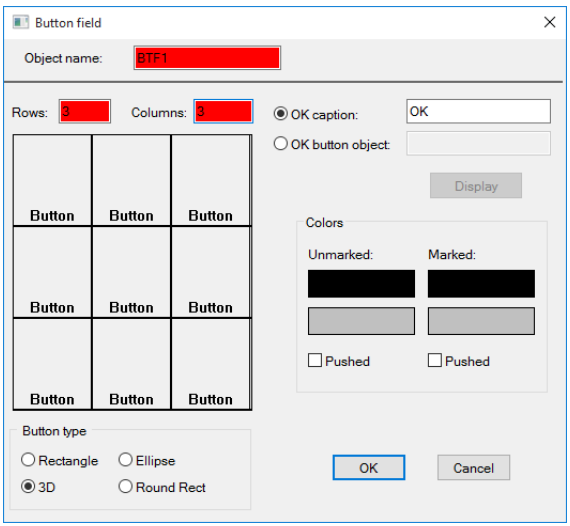
Show pushed ☑ Button is shown as pushed.
☐ Button is shown as not pushed.

Action Calls up the **Action** parameter definition dialog, see Configuring an action on page 115.

Action needs confirmation

If an action has been configured which requires a confirmation before it can be executed - checkbox *Action needs confirmation* selected when configuring this action - you can select a foreground and background color for this state (action has been triggered, but is not yet written) so that the button will clearly indicate that a confirmation is required. See Color selection on page 87.

Set parameters for button field



Button field.png

Rows/Columns Number of button rows and columns, maximum 5 each. The button display is modified accordingly.

OK caption /OK button object
Text or graphic object for confirm button (pre-set to **OK**).

Button Diagrammatic representation of the buttons, excluding the confirm button. A mouse click on a button opens the dialog for specifying the **button** parameters.

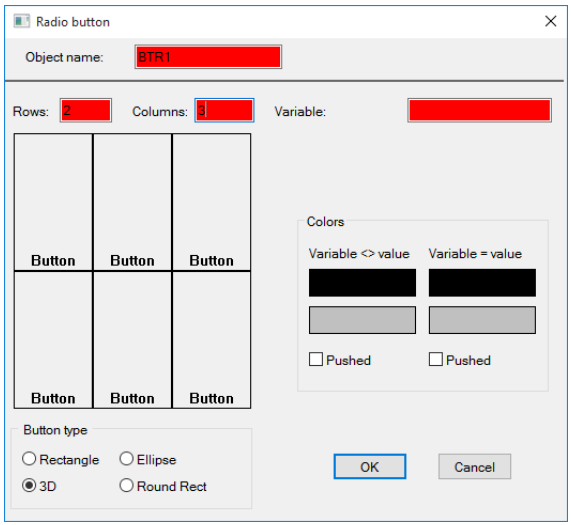
Colors Color definition is relevant to all button texts and the background of all buttons.

Unmarked/Marked
Respective color settings for button texts and buttons when the button is not selected or selected. A mouse click on the upper color field selects the text color, and a click on the lower color field selects the button color, both selections being performed in the **Color Selection** parameter definition dialog (see Color selection on page 87).

Pushed ☑ The button is shown as pushed.

Button type Display format of the button in the graphic display.

Set parameters for radio button fields



Radio button.png

Variable The process variable associated with all the buttons in the radio button field. For details of select fields, see Configuring an action on page 115.

Rows/Columns Number of button rows and columns, maximum 5 each. The button display is modified accordingly.

Button Diagrammatic representation of the buttons. A mouse click on a **button** opens the dialog for specifying the button parameters. For details of select fields, see Set parameters for button field on page 153.

Colors Color definition is relevant to all button texts and the background of all buttons.

Variable <>Value / Variable = Value
Respective color settings for the buttons and button texts when the value of the associated variable is **different from** or the **same as** the specified value.
A mouse-click on the upper color field selects border and text color,

while a click on the lower color field selects the button background color, both through the **color selection** parameter definition dialog (see Color selection on page 87).

Pushed ☑ The button is shown as pushed.

☐ Pushed, the button is shown as not pushed.

Button type Display format of the button in the graphic display.

Set parameters for individual buttons using the button parameter definition dialog

The procedure is basically the same as configuring an individual button (see Button, Button field, Radio button on page 149) but the following special considerations must also be taken into account:

Variable Not used for buttons in a **button field**, but for **radio buttons,** the associated variable is shown here.

Value For radio buttons, the reference value of the associated variable is shown here.

Without function

☑ The selected button is eliminated optically and functionally from the button field.

☐ The button is displayed with the selected color and with the text entered.

Action Calls up the Action parameter definition dialog. See Configuring an action on page 115.

Variable = Value

No function

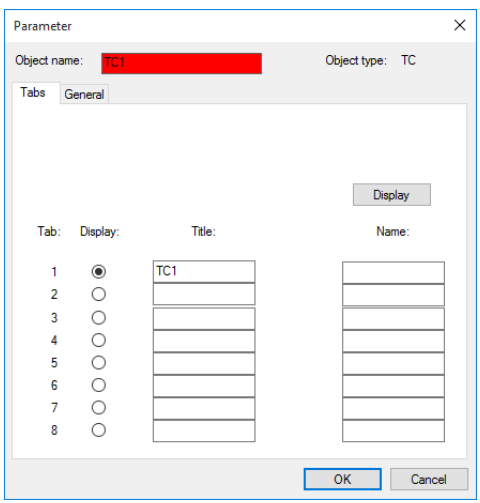
3.5.25 Tab control

> **Animate** > **Tab control**
> A mouse click fixes the position of the top left-hand corner and, by pulling the rectangle, the size of the Tab control can be specified. Another click of the mouse at this point concludes the procedure,
> Enter data in the parameter definition dialog,
> Display the Tab control with frame.

The **Tab control** exists as a new dynamic object. Up to 8 tabs can be administered in this element. To each tab a group of static and/or dynamic graphic objects can be assigned.

By selection of one of these up to 8 tabs the assigned graphic object is put into the display foreground in Freelance Operations.

Set parameters for tab control



Tab control.png

Tab for Tabs

Tab	Number of possible tabs (1 to 8)
Display	Specifies which tab is displayed first.

Heading	Indicates the heading of the corresponding tab (can be selected freely).
Object name	Indicates the name of the associated graphic object.
Display	The button is used to select the graphic object or object group to be displayed on the marked tab. The object is selected and switching through *"Return to object"* to the field *"Object name"* its name is entered there.
General Tab	For **General** Tab see General tab on page 114.

3.5.26 List of the dynamic objects in a graphic display

> **Animate** > **Reedit...** > Display of the object list

The tree structure of the object list is used for displaying all dynamic graphic objects in the current graphic display, and for selecting one of them. After an object has been selected, it can then be modified using the appropriate parameter definition dialog.

3.5.27 Reedit

A graphic object must be selected before its parameters can be changed. This can occur in two ways: select the object in the graphic display and double-click on it, or use the alternative through the **Reedit** menu**.**

> Select animated graphic object > **Animate** > **Reedit**
Or
> **Animate** > **Reedit** > Display object list

All the dynamic graphic objects are displayed in the object list with their type and name. A dynamic object that has been previously selected is preselected in the list. After an object has been selected, clicking on **OK** or double-clicking on the list entry will open the parameter definition dialog for the selected object.

For the configuration of Actions, the drawing order of the graphic elements is important. If the graphic area in Freelance Operations is clicked, the action of the topmost object will be processed; the action of a lowermost object will not be accessible.

3.5.28 Reediting allocated static objects

Static objects that have been allocated to a dynamic object are no longer directly available in the graphic display. This applies to objects that have been configured as foreground or background objects as well as to objects used in defining the dynamic object states (graphic symbol, Tab control or fill levels). These objects which have already been assigned can be modified through the following procedure taking the graphic symbol as an example:

> Click on the graphic symbol and select the Display tab
> Position the cursor in the field containing the name of the object to be modified
> Switch to the graphic display using the **Display** button

The static object can now be modified using the usual functions.

The graphic editor is still in “Define parameters for a graphic symbol” mode. This mode can be recognized: most of the toolbar buttons are disabled. This mode must be exited using the menu command **Edit/Return to object**.

A corresponding procedure can be used to retrospectively modify foreground and background objects as well as polygon figures that have been assigned to a fill level.

An additional step is required in order to retrospectively modify a message type symbol: the message type symbol must be detached from the graphic symbol. To avoid losing the parameters of the graphic symbol in this process, a new static object is defined for the duration of the editing process.

> Click on the graphic symbol and select the **Display** tab
> Position the cursor in the field containing the name of the object to be modified
> Switch to the graphic display using the **Display** button
> Draw any static object
> Return to graphic symbol parameters through **Edit/Return to object**
> Exit parameter definition for graphic symbol with **OK**.

The message type symbol can now be modified with the usual functions.

After all the changes have been carried out:

> Select graphic symbol and invoke tab **Display**
> Position cursor in the field with the name of the newly drawn object
> Switch to the graphic display using the **Display button**
> Select the changed message type symbol (the newly drawn object will be deselected at this point).
> Return to parameter definition dialog for graphic symbol through **Edit**
> **Return to object**
> Exit parameter definition dialog for graphic symbol with **OK**.

The newly drawn object is now once more freely available, and can be deleted.

3.6 Macro

Graphic objects can be grouped together and stored as a macro. Macros are available anywhere in an entire project and can be used as many times as required in graphic displays. Subsequent changes to a macro effect all displays in which the macro was used.

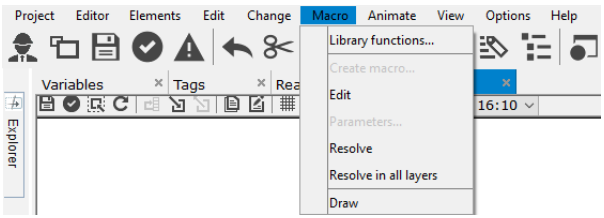
A macro consists of any combination of static and dynamic graphic objects. All attributes of the objects contained in the macro can be defined as macro parameters. Each time a macro is used, these attributes, which are part of the macro definition are stored; all the values specified as parameters can be individually adjusted at each instance of the macro's use.

Macros can be saved in libraries and thus be made available for other projects. Similarly, macro libraries can be loaded, in order to make one or all of their macros available in the current project. Library files have the extension .BOL.

All macros which are available in a project, are listed below the Project tree node Graphic macro pool (P-MAC). A graphic macro in a project can be created through several methods:

- Directly from a graphic display by saving any objects as a macro.
- Create new entry below Graphic macro pool (P-MAC) node in the Project tree and edit with the macro editor.

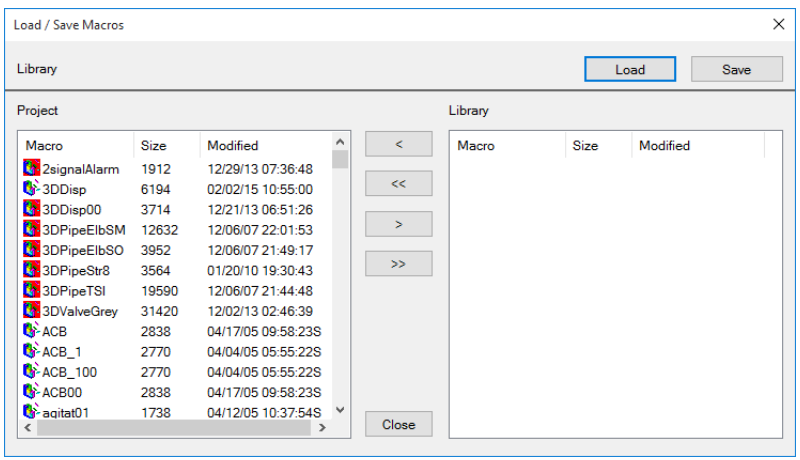
- Open any macro library and load a graphic macro from the library into the project.



Macro.png

3.6.1 Library functions

Graphic editor > Macro > Library functions...



Library.png

Library Path and filename of the most recently loaded macro library.

Project In the left portion of the dialog, the graphic macros available in the project are listed. An icon with red background displayed on top of a macro name indicates a macro that was used in the project.

Library In the right portion, the contents of the most recently loaded macro library are listed.

Load A macro library can be loaded from a data carrier. After loading, the macros in the library are displayed in the right portion of the dialog.

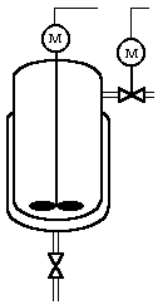
Save	After entering a directory and filename all macros listed in the right portion of the dialog are saved on the data carrier. The dialog display is not changed.
>	All marked graphic macros of the project (left portion of the dialog) are copied to the library list (right portion).
>>	All graphic macros of the project (left portion of the dialog) are copied to the library list (right portion).
<	All marked graphic macros in the library list (right portion of the dialog) are copied for use in the project (left portion).
<<	All graphic macros in the library list (right portion of the dialog) are copied for use in the project (left portion).
DEL	All marked graphic macros are deleted from the list. In the project list, only macros can be deleted which have not been used in the project.

3.6.2 Draw macro

> **Macro** > **Draw**
> All macros which are currently available in the project are listed. This list is identical to the content of the Graphic macro pool (P-MAC) in the Project tree.
> Select macro > **OK**,
> Position the top left corner of the macro with a mouse-click.

3.6.3 Create macro

> Select one or more graphic objects in the graphic display
> **Macro** > **Create macro**...



The list of all macros available in the project will be displayed. The name of the new macro must be entered in the input field above the list. After entry of a valid name, the dialog is concluded and the selected objects are displayed with a common frame. The individual objects are no longer available: they have been replaced by a macro reference.

A graphic macro can also be created from the Project tree in the Graphic macro pool (P-MAC):

Right-click on Graphic macro pool > **Insert** > **next level**
> select **Graphic macro MAC**

3.6.4 Edit macro

Graphic editor > **Macro** > **Edit**...
Or
Double-click a Graphic macro in the Project tree

The list of all macros available in the project will be displayed. If a macro had been selected in the graphic display, then that macro will be shown selected in the list. After a macro is chosen from the list, the graphic editor is called up in macro edit mode **(macro editor)**.

In the graphic display the background color is changed and only the graphic objects belonging to the macro will be shown.

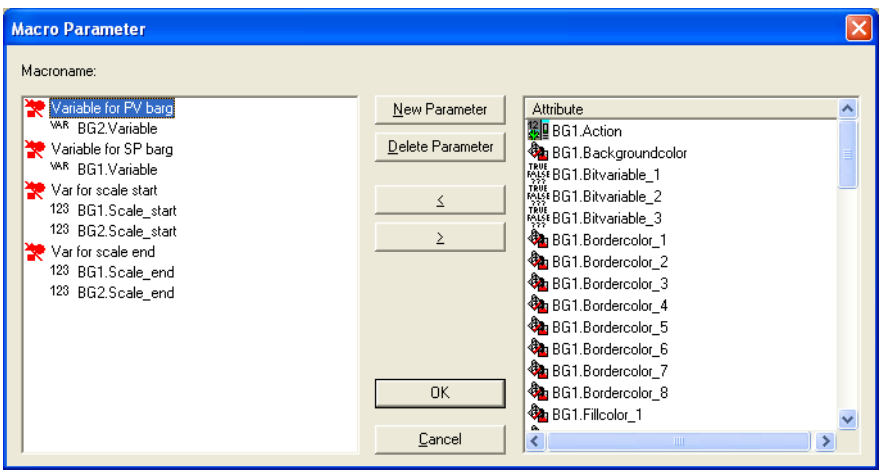
All graphic editor functions are available in the macro editor. Any combination of static and dynamic graphic objects can be added to or deleted from the macro. Similarly, all attribute changes and animations possible with the graphic editor are also allowed.

3.6.5 Define macro parameters

The **parameters** of a macro are set with the macro editor. All graphic attributes defined to be parameters can be adjusted individually in each instance of the macro's use. All values which are not defined to be parameters remain the same in all instances and not be varied.

All animation (display and bit variables) must be defined to be parameters.

> **Macro > Parameter**...



tu0602us.bmp

In the right portion of the dialog all attributes of all named objects are listed. Dynamic objects always have names, so their attributes always appear in the list. Static objects whose attributes are to made adjustable as macro parameters must be given names (**Change > Define object name**, see Object name define on page 183).

Graphic attributes are displayed with the name of the object and a system-assigned designation for the attribute: <Objectname>.<Attribute designation>.

In the left portion of the dialog, the macro parameters are listed. For each macro parameter, the object attributes which will take on that parameter value are shown.

New Parameter

A new entry in the left dialog field is created with a standard name. The standard name can be changed.

Delete Parameter

The macro parameter selected in the left dialog field is deleted. The attributes which were assigned to the deleted parameter are transferred to the right portion of the dialog.

< A graphic attribute in the right portion of the dialog is assigned to the macro parameter which is selected in the left portion. The macro parameter data type is determined when it is assigned its first attribute. Any number of attributes of the same type can be assigned to a macro parameter. Attributes which have been assigned to a macro parameter no longer appear in the right portion of the dialog.

> The assignment of an attribute to a macro parameter is undone. The attribute selected in the left portion of the dialog is disassociated from the macro parameter and reappears in the list of attributes in the right portion.

The following attribute designations are used in the system:

When used in dynamic objects, the designators are extended by sequence numbers (usually 1–8 or for objects in a trend window, 1–6) or, for button fields, by <column> and <line number>, see also General parameters for dynamic graphic objects on page 103.

Attribute designator	Object type	Meaning
Action	BG, FA, AD, SEL, SA, GS, BUT,BTF, TC	Action which can be triggered by this object in Freelance Operations
Bit variable_1..3	BG, FA, AD, SA, GS	Bit variables which control attribute changes in the object
Caption, Caption_1..2	TXT, BUT, BTF, BTR, CUO	Static text, button text or trend graph labeling
Faceplate_1..6	CUO	Tag faceplates assigned to the curves

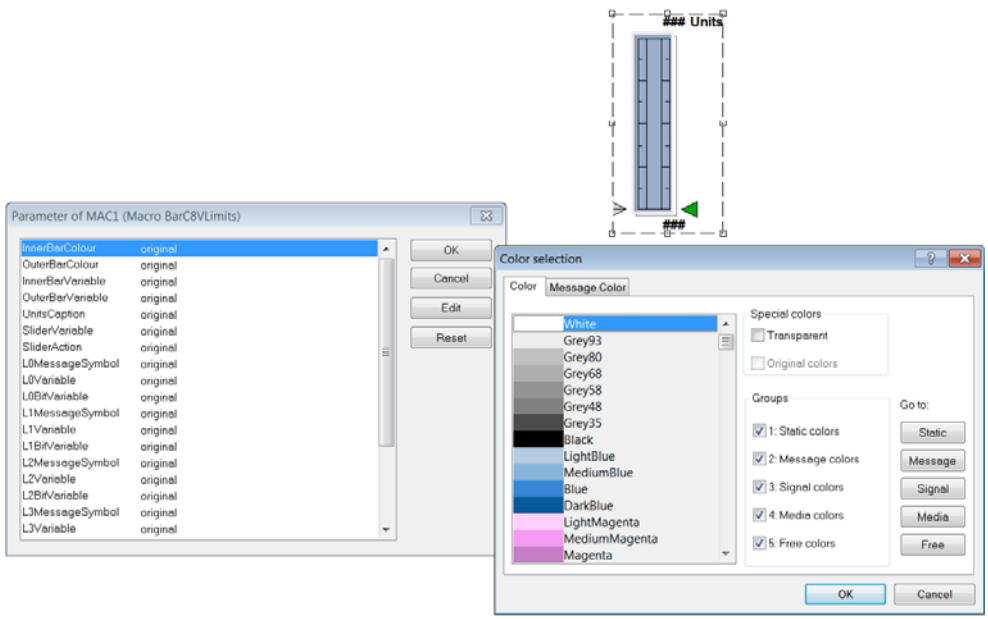
Attribute designator	Object type	Meaning
Windowcolor_1..3	CUO	Trend window colors: 1: Background color, 2: Grid and labeling color, 3: Graph area background color
Fillcolor, Bordercolor	BG, FA, SA, GS, SEL, BUT, BTF, BTR	Border and fill color
Fillpattern	PIE, ELP, PLG, REC, BG, FA, SEL	Fillpattern
Trendcolor_1..6	CUO	Curve colors
Line_start	ARC, LIN, PLN	Starting end of line: round or with arrow
Linewidth	ARC, PIE, ELP, LIN, PLG, PLN, REC, BG, FA, SEL	Line width
Line_end	ARC, LIN, PLN	Ending end of line: round or with arrow
Line color	ARC, PIE, ELP, LIN, PLG, PLN, REC, BG, FA, TC	Line color
Line_rounded	ARC, LIN, PLG, PLN, REC, BG, FA, SEL	Rounding of corners
Line style	ARC, PIE, ELP, LIN, PLG, PLN, REC, BG, FA, SEL	Type of line: solid or dotted, ...
Max_Duration	CUO	Maximum trend collection period
Reference	BG, FA	Bar graph and fill area reference line
Text_direction	TXT, AD, BUT	Text direction: horizontal or vertical

Attribute designator	**Object type**	**Meaning**
Character font	AD, BTF, BTR, BUT, TC	Character font of the text: Arial, Courier New, Lucida Console or MS Sans Serif
Character size	TXT, AD, BUT, TC	Text size: 8, 12, 20 or 26 point
Scale_start, Scale_end	BG, FA	Scale range for object or curve
Scale_start_1..6, Scale_end_1..6	CUO	Scale range for curves
Std_Duration	CUO	Trend display duration
Tab Control_1..8	TC	Tab Control
Text_alignment	TXT	Text alignment: top or bottom
Text_bold	TXT, AD, BUT	Bold text
Text_fixpoint	TXT, AD, BUT	Text justification: start, center, end
Text_italic	TXT, AD, BUT	Italic text
Text_underlined	TXT, AD, BUT	Underlined text
Textcolor, Back-ground	TXT, AD, TC	Text color and background color
Tooltip	AD, BTF, BTR, BUT, CUO, FA, GS, SA, SEL, TC	Tooltip
Variable	BG, FA, AD, BUT, BTR	Display variable
Variable_1..6	CUO	Variables for trend monitoring
Background color, Foreground color	PIE, ELP, PLG, REC, BG, FA, SEL, TC	Fill pattern colors
Value	BUT, BTR	Button value, used for state display

3.6.6 Specifying parameters for a macro instance

A macro is inserted into the graphic display with its default settings. All attributes which were defined in the macro editor to be parameters can be individually adjusted for each instance of the macro's use. When a macro is selected in the graphic display, all the macro's parameters and their current values are listed.

> **Macro > Parameter**...



tu0603_us.png

Edit The selected macro parameter can be specified for the present instance of the macro. Depending on the type of parameter, the appropriate dialog is opened. Only those entries relevant to the specification of the macro parameter are available. All attributes which were assigned to this macro parameter in the macro editor will take on the new parameter value. The new value will be shown in the list.

3.6.7 Resolve macro

With a macro selected in the graphic display > **Macro** > **Resolve** will disassociate the macro objects. All elements of the macro will be displayed with their own construction frames and can be changed individually.

3.6.8 Macro: Resolve in all layers

Resolve all layers upon selection of several objects in the graphic display and > **Macro**.

Whilst *Resolve macro* only applies to the previously selected macro, the *Resolve in all layers* menu item ungroups all selected objects like the graphic symbol or tab control, including all underlying grouped macros.

3.7 Editing and changing display objects

3.7.1Changing the size of a graphic object

Changing the size without altering the height-to-width ratio

> Select > place cursor arrow on a corner handle, > Press mouse button and drag, > Frame gets larger or smaller > Release mouse button, > Graphic item/symbol is redisplayed.

Changing height or width

> Select > place cursor arrow on an edge-center handle > Press mouse button and drag, > Frame gets larger or smaller > Release mouse button, > Graphic item/symbol is redisplayed.

Each graphic object be it a static, dynamic, combined object or a macro is displayed with its attributes at its assigned position. When selected, a frame with marks (handles) at the corners and edge center points surrounds the graphic item. (Exceptions are horizontal or vertical lines, on which only the two end points are marked). A cursor click outside this rectangle deselects the graphic object, and a click within the rectangle selects it again. If one clicks one of the corner handles of the frame, the cursor arrow changes. With the mouse button depressed, the frame can then be enlarged or reduced while maintaining its height-to-width ratio. After

releasing the button, the graphic object is displayed within the new frame. Clicking on an edge-center handle allows the height or width of the object to be changed independently.

3.7.2 Move a graphic object

> Select > Cursor arrow into the center > Press mouse button and drag.

After clicking on a graphic object, its frame is displayed. By positioning the cursor inside the frame and keeping the left-hand mouse button depressed, the cursor changes into a cross. While the mouse button is depressed, the rectangular outline of the graphic can be moved about the entire draw area. On releasing the mouse button, the item is redisplayed at this point.

When moving several graphic objects (see Selecting multiple graphic objects on page 169), a common frame surrounds them all. They can then be moved in exactly the same manner as a single graphic object.

3.7.3 Selecting multiple graphic objects

> **SHIFT** key and click on each of the required graphic objects.

Or

> Position cursor outside the graphic objects to be selected, > With the left mouse button depressed, drag a marking rectangle over the area.

Or

> Right-click > **Select** > **All/all static objects /all dynamic objects**

In order to change attributes of several graphic objects together, it is possible to select various graphic objects at once. With the **SHIFT** key depressed, the required graphic objects can be clicked. Several graphic objects can also be selected together with a marking rectangle. In doing so, only those graphic objects are included which lie completely within the marking.

Each graphic object is displayed with its frame. Alterations of the line and area attributes effect all selected objects.

If several graphic objects have been selected and if one then wants to select a single one of them, click on the free draw area with the left mouse button (all graphic objects will be deselected) and proceed as above.

Several objects can be selected and moved together. As a result, it is possible that individual objects are moved outside of the visible drawing area. If the selection is then canceled, these objects cannot be selected with the common procedures The plausibility check generates a message, that the graphic contains objects outside the visible area.

Use the following procedure to delete these objects from the graphic display:

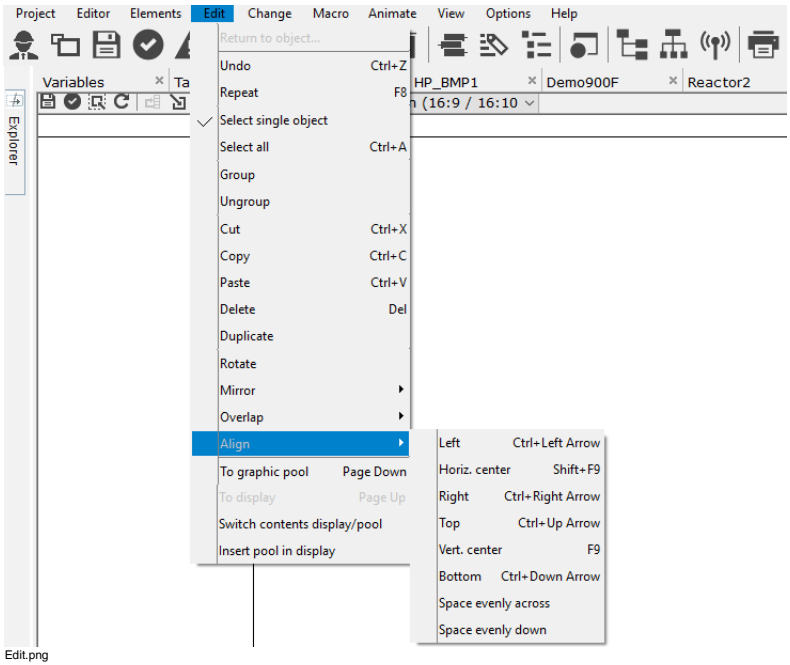
> Edit > **Select all** > all objects in the drawing are selected.
> Press **SHIFT** key and left mouse button to select all visible objects.
> Press **DEL** key or select **Edit > Delete** to delete all objects that are not visible in the display.

After all static objects have been selected the display background can be stored as a bitmap with **Display > Export > As bitmap to clipboard** (or **CTRL + B**).

In order to achieve the shortest possible display build-up times under Freelance Operations you are strongly advised to store and continue using the static part of the display as a bitmap after the editing is finished. In a new graphic display this bitmap is imported as a background, and the animation is performed in the foreground of this bitmap.

3.7.4 Edit

Under the menu **Edit** are listed the items which facilitate the creation and modification of displays.



Edit.png

Return to object

> **Edit** > **Return to object**...

For some graphic objects (message type symbol, fill area, graphic symbol, self-animated object, button) there is the possibility of switching to the static graphic section from the parameter definition dialog pressing the **Display** button during configuration. The **Return to object** menu item must be selected in order to return to the parameter definition dialog.

Undo

> **Edit** > **Undo**

This is a one-level function and undoes the last change made to the graphic object.

Repeat

> **Edit** > **Repeat**
Or
Press **F8**

The last action can be repeated, e.g. deleting the end point of a polyline or drawing graphic objects of the same type one after the other, without having to select the type again under **Draw**.

Select single object

If several graphic objects have been selected and one wants to select a single one of these, then click on the free draw area with the left mouse button (all graphic objects will be deselected) and proceed as above.

> Click graphic object.

Every graphic object selected is marked by a frame.

Select all

> Sweep over the whole drawing area with the left mouse button pressed.

All graphic objects in the drawing area are displayed with their frames. Alterations of the attributes impinge on all the graphic objects selected.

Select graphic objects in the background

If the CTRL key is held down and the mouse clicked, all covered graphic items/ symbols can be selected in turn and then edited.

Group

> Select graphic objects > **Edit** > **Group**.

Several graphic objects can be grouped to form a new graphic object with a common frame. Alterations of size, attributes or movement now apply to the newly created graphic object.

No combined graphic objects can be used for the creation of macros. If necessary, a grouped graphic must be broken down into its elements (Menu item **Edit** > **Ungroup**).

Ungroup

> Select combined graphic object > **Edit** > **Ungroup**.

Grouped graphic objects are dispersed into their individual graphic objects. In doing so, the common frame disappears and all the components of the combined graphic objects are displayed separately with their frames.

Graphic objects which are connected with one another through animation cannot be broken down into their elements with this menu item. To separate them, see General parameters for dynamic graphic objects on page 103.

Cut

> Select one or more graphic objects > **Edit** > **Cut**.

The selected graphic objects are removed from the draw area and saved in a buffer memory (not the standard Windows clipboard).

With **Paste** the saved objects can be reinserted into the graphic one or more times.

Copy

> Select one or more graphic objects > **Edit** > **Copy**

The selected graphic objects are copied and saved in a buffer memory (not the standard Windows clipboard).

With Paste the saved objects can be inserted into the graphic one or more times. The copied object is copied to match the original and displayed as it was when selected. It can be moved to any position. See Move a graphic object on page 169.

Paste

> **Edit** > **Paste**

The graphic objects which were saved in the buffer memory (not the standard Windows clipboard) via a **Cut** or **Copy** command can be inserted into the draw area.

Items are inserted at the location from which they were cut or copied.

Delete

> Select one or more graphic objects > **Edit** > **Delete**

The selected graphic objects are removed from the draw area.

Duplicate

> Select one or more graphic objects > **Edit** > **Duplicate**

The selected graphic objects are duplicated on the draw area and not saved in the buffer memory. The duplicate is displayed slightly offset from the original and is selected. It can then immediately be positioned as required (see Move a graphic object on page 169).

Rotate

> Select one or more graphic objects > **Edit** > **Rotate**

Each of the selected graphic objects is rotated 90 degrees counterclockwise around the center point of its frame.

Texts are rotated around their fixed reference points.

Mirror

> Select one or more graphic objects > **Edit** > **Mirror** > **Horizontal** or **Vertical**.

The selected graphic items are mirrored horizontally or vertically, as required. The imaginary mirror axis passes through the center point of the surrounding frame.

Texts cannot be mirrored. If text exists in a grouped graphic object, its position is mirrored but not the text itself.

Overlap

Serves to determine which of superimposed graphic objects lies in the foreground or background.

It should be noted here that in a graphic display under Freelance Operations, all static items are located in the background behind any dynamic objects as a result of the cyclical redisplay of those dynamic objects. There is, however, one exception. See Animate, dynamic graphic objects on page 100.

If self-animated objects are used in a Graphic display, the appearance of text objects may be unclear.

This problem can be solved by changing the display sequence of the objects in the Graphic editor. All self-animated objects are configured in the foreground of the other objects through select **Self-animated graphic object** > **Edit** > **Overlap** > **Foreground**.

Foreground

> Select graphic object > **Edit** > **Overlap** > **Foreground**

The selected graphic object is displayed on top of the other graphic objects. It may cover the other items partly or entirely.

Background

> Select graphic object > **Edit** > **Overlap** > **Background**

The selected graphic object is displayed underneath the other graphic items. It may be partly or completely covered.

In front of object

> Select graphic object > **Edit** > **Overlap** > **In front of object**,
A Select object dialog with **OK** and **Cancel** buttons appears,
> Select the graphic object in front of which the object first selected is to be inserted,
> Accept with **OK** in the superimposed window.
Cancel can be used to abort the process at any time.

In case of several overlapping graphic objects, the overlap sequence can be specified here.

Behind object

> Select graphic object > **Edit** > **Overlap** > **Behind object**,
A Select object dialog with **OK** and **Cancel** buttons appears,
> Select the graphic object behind which the object first selected is to be inserted,
> Accept with **OK** in the superimposed window.
Cancel can be used to abort the process at any time.

In case of several overlapping graphic objects, the overlap sequence can be specified here.

Align

> Select one or several graphic objects > **Edit** > **Align** > **Left, Horiz. center, Right, Top, Vert. center, Bottom, Space evenly across, Space evenly down**

The selected graphic objects are aligned to the left, horizontally centered, to the right, towards the top, vertically centered or towards the bottom or distributed horizontally or vertically. Reference point is always the object selected last.

To graphic pool

> **Edit** > **To graphic pool**

The command is used to switch to the graphic pool. If graphic objects are selected, they are also added to the graphic pool, being inserted at the same location as in the graphic display.

In this process, some graphic objects may be covered up and thus need to be moved. See Move a graphic object on page 169.

To display

> **Edit** > **To display**.

Switch to the graphic display. If graphic objects are selected, they are accepted into the graphic display and inserted at the same location as in the graphic pool.

In this process, some graphic objects may be covered up and thus need to be moved. See Move a graphic object on page 169.

Switch contents display/pool

> **Edit** > **Switch contents display/pool**.

The entire contents including background color of the graphic display and the graphic pool are exchanged.

Insert pool in display

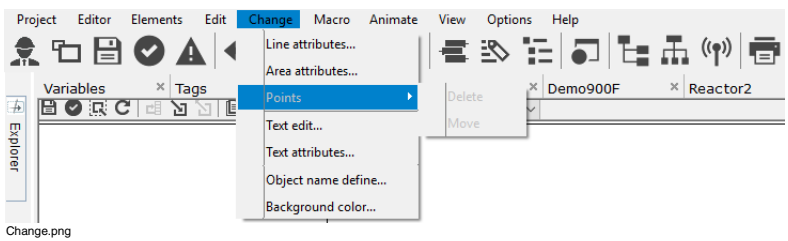
> **Edit** > **Insert pool in display**.

The complete display contents of the graphic pool are accepted into the graphic display. The background color of the graphic display is retained.

In certain cases, graphic objects may be covered up in this process and thus need to be moved. See Move a graphic object on page 169.

3.7.5 Change attributes

The various line, area and text attributes, as well as the text content of the selected graphic objects can be altered. If similar graphic objects or grouped graphic objects comprised of several graphic objects of the same type have been selected, then all attributes are changed together. A general alteration of attributes, however, to effect subsequent graphic objects, must be made through the **Toolbox**.



Change.png

Several objects can be selected and moved together. As a result, it is possible that individual objects are moved outside of the visible drawing area. If afterwards the selection is canceled, these objects cannot be selected any more with the common procedures The plausibility check generates a message, that the graphic contains objects outside the visible area.

Use the following procedure to delete these objects from the graphic display:

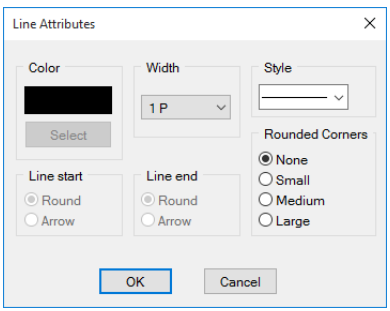
> **Edit** > **Select all** > All objects in the drawing area are selected.
> Deselect all visible objects pressing the **SHIFT** key and the left mouse button.
> **Edit** > **Delete** or press the **DEL** key to delete all objects not visible in the graphic display.

Line attributes

> **Change > Line attributes**

The graphic object line with the attribute invisible is not particularly useful. It can be obtained, if required, through > **Edit > Select all**.

The line attributes of the selected graphic objects are altered in a dialog window.



Line Attributes.png

Color The attribute **Line color** is available both for all static graphic objects, with the exception of text and bitmaps, and for the dynamic objects bargraph, selection field and fill area. You can choose any of the 237 colors or *invisible*. See Color selection on page 87.

Width The attribute **line width** applies to all static graphic objects with the exception of text and bitmaps, and also to the dynamic objects bar graph, selection field and fill area. 6 width sizes can be selected. Dimensions like 1P, 5P etc. are abstract and depend on the screen resolution; they do not refer to the pixel size.

Style The attribute **line style** applies to all static graphic objects with the exception of text and bitmaps, and also to the dynamic objects bar graph, selection field and fill area. *Continuous, dashed, dotted,* or *dash-dotted* can be selected.

Line start/Line end

The attribute **line start/end** only applies to the static graphic objects line, polyline and arc. An arrow can be selected at the start and/or end. The size of the arrow depends on the line width.

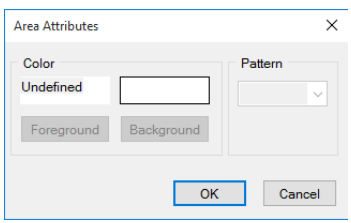
Rounded Corners

The attribute **rounded corners** applies to the static graphic objects rectangle, polyline and polygon, and to the dynamic objects bar graph, selection field and fill area. *None, small, medium* or *large* can be selected.

Area Attributes

> Change > Area attributes

The area attributes apply to the static graphic objects rectangle, polygon, ellipse and circle segment and to the background of the dynamic graphic objects bar graph and fill area. The attributes of an area are changed in a dialog box. In the bottom left-hand corner of that window a preview of the selected area attributes is shown.



Area Attributes.png

Color Any of 237 colors each can be selected for **foreground** and **background**. The color settings have no effect with the pattern setting **invisible,** and the background color chosen has no effect with a filled pattern. See Color selection on page 87.

Pattern Any of 15 patterns or **invisible** can be selected. For the pattern “black bars”, the fill area is displayed in the fill color selected for the foreground. For the pattern **invisible**, the underlying graphic items/symbols are visible.

Points

The construction points of the graphic objects polyline and polygon can be moved or deleted.

Delete

> Select graphic object **polyline** or **polygon**, > **Change** > **Points** > **Delete** > Click the point to be deleted. The graphic object remains selected and is redisplayed in the altered form.

Move

> Select graphic object **polyline** or **polygon**, > **Change** > **Points** > **Move** > Click the point to be moved and move it to the required position with left mouse button pressed (the frame disappears). > Releasing the left mouse button completes the action. The graphic object remains selected and is displayed with the shifted points.

Text edit

> **Change** > **Text edit**.

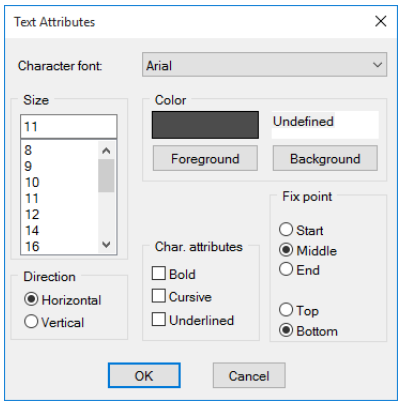
Selected texts can be altered. An input dialog box with the existing text appears in which text can be added or deleted. The text attributes are not effected.

If a combined graphic object contains several texts, the texts are presented for modification one after the other.

Text attributes

> **Change** > **Text attributes**.

Text attributes apply to the static graphic object **text** and to the dynamic objects **alphanumeric display, button, button field** and **radio button field**. The attributes of selected texts can be changed in a dialog box.



Text Attributes.png

Character font

Arial, Courier New, Lucida Console, or MS Sans Serif can be selected.

Color Any of 237 colors can be selected for foreground and background. In addition, *invisible* may be selected as background.

Size Choice of text size in pixels. Display created with the Graphic editor are independent from the screen resolution. Therefore the font size is not identical with size used in other Windows applications.
The font size can be increased/decreased by changing a text object with the mouse. Likewise the font size of texts configured within a graphic symbol, a macro, or within foreground or background objects in dynamic graphic objects is automatically adjusted when the encompassing objects are changed in size.

Alignment There is a choice between **horizontal** and **vertical** text.

Fix point Point used for positioning a text. It is situated on the frame at the site specified horizontally at start, middle or end and vertically by top or bottom. The Rotate and Horizontal/vertical Alignment functions turn the text around this point. The selections *Top* and *Bottom* are only available for the object **Text**.

Start ◉ Left frame edge

Middle ◉ Horizontal center of frame

End	◉	Right frame edge
Top	◉	Upper frame edge
Bottom	◉	Lower frame edge.

Character attribute

Additional choice for text output between Bold, Italics and Underlined.

Object name define

> Select individual or combined graphic object, > Change > Object name define...

A name must be unique in a graphic display.

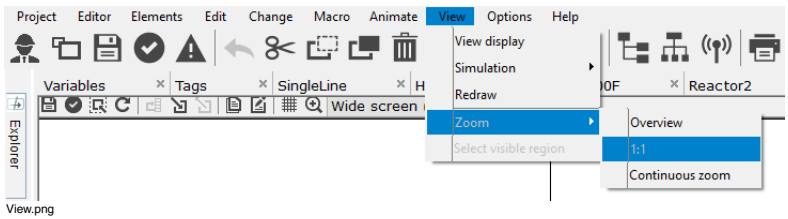
Graphic objects can be provided with names (maximum 12 characters). Using these names for the dynamic or graphic symbols they can be moved, shifted or exchanged. If a name has already been assigned to the selected graphic object, that name will be displayed and can be changed.

Background color

See Background color on page 87.

3.8 Display options for graphics in the draw area

Under the **View** menu are the various options relating to viewing graphics on the screen.



View.png

3.8.1 View

> **View** > **View display**
> Displays the graphic with no grid, no toolbox and no frame. Most of the menu choices are disabled.
To return for further editing,
> **View** > **View display**,
> Display the graphic and enable the menus prior to quitting; or click mouse within the draw area.

View allows the graphic currently being created to be viewed at zoom level 1 (full display) and without the distraction of the editing tools (snap, frame, toolbox). In this state most of the menu functions are disabled. Selection from menu or pressing the **Spacebar** once returns to a state in which editing can be performed.

3.8.2 Simulation

> **View** > **Simulation**
> Switch simulation on or off and select the simulation speed.
> All self-animated graphic objects are shown in the graphic display with the chosen simulation attributes.

When in **View** the simulation attributes come into play for all self-animated objects; when the graphic editor is in *View* the simulation attributes can also be modified.

3.8.3 Redraw

> **View > Redraw**
> Graphic is redisplayed on the screen with no change to the zoom level.

The graphic is reconstructed. This is necessary, if the current display of the graphic on the screen does not correspond to the real graphic (parts of the frame may, for example, have been left behind).

3.8.4 Zoom

A graphic display is usually displayed with **Zoom** switched off (Zoom 1-fold) as a whole graphic in the draw area. For easier editing it is possible to display a section of the graphic with various enlargement. The selected zoom level is indicated in the toolbox under Display.

> **View > Zoom > Overview**
The Overview function shows an area corresponding to 9 x the drawing size. The actual draw area is shown in the center, marked with a border. This function enables objects located completely or partially outside the applicable draw area to be displayed and identified.

> **View > Zoom > 1:1**
The full graphic display will be shown on screen.

> **View > Zoom > Continuous Zoom**
> Display the graphic with a dashed rectangle
> Use the mouse to move the rectangle over the required region of the graphic
> Left mouse click for zoom in
> Right mouse click for zoom out
> press "**ESC**" or click the zoom button on toolbar again to stop continuous zoom.

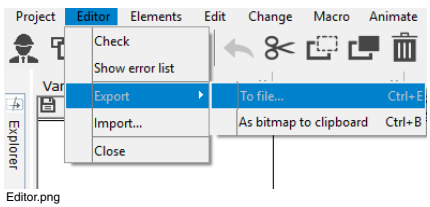
3.8.5 Visible region

> **View > Select visible region**
Or
Right-click > Graphic is displayed with a dashed rectangle,
> Use mouse to move rectangle and position it over the required region,
> Click mouse to display this region with the selected zoom level.

In order to select a display region (for zoom level > 1), **Select visible region** makes a rectangle appear in the draw field. This rectangle can be moved around the draw area. Following a mouse click or after pressing the Spacebar, the area located underneath it will be displayed enlarged by the selected zoom level.

3.9 General handling functions

All functions necessary for the general handling of graphics are located under the **Editor** menu.



Editor.png

3.9.1 Save

> **Project > Save tab**

Save graphics is either carried out explicitly with **Save** or at a prompt when quitting the project. During the creation of a Graphic display it is advisable to occasionally save in order to keep data loss as low as possible in the event of any unexpected problems with the PC. The buffer display is always saved automatically as well.

3.9.2 Plausibility check

> **Editor** > **Check**

The entire graphic display with its static and dynamic graphic items, macros and parameter inputs undergoes a plausibility check for errors, missing inputs or contradictions. Any errors are listed in a window and must be remedied afterwards. A listed error message from the plausibility check can be selected with a double-click on the message with the left mouse button or by pressing the relevant screen button. Either of these actions has the effect of selecting the appropriate graphic object for editing.

3.9.3 Export to a file

> **Editor** > **Export** > **To file**...,
> Specify file type: Freelance metafile or bitmap file
> Enter path and file name > **Save**.

Individual graphic displays can be exchanged between different projects through files. A file is created with **Export**. After invoking **Export** a window is opened in which the filename and path should be entered. As export data type you can choose between the Freelance file format with the extension DMF or a bitmap file with the extension BMP.

3.9.4 Export to clipboard as a bitmap

> **Editor** > **Export** > **As bitmap to clipboard**

The Graphic display is saved on the Windows clipboard as a bitmap, and is thus available for further processing by other Windows applications. If graphic objects are selected, these are saved as a bitmap; if no object is selected the complete Graphic display is saved.

3.9.5 Import

> **Editor** > **Import**
> > Enter path and filename with extension, .DMF or .DXF
> > **Open**, Graphic display is loaded.

To import a Freelance graphic metafile (extension .DMF) created under **Export** or a file created in AutoCAD (extension .DXF) into a project, **Import** must be selected. After selection, a window is opened, where the path must be entered and the filename entered or selected. The corresponding Graphic display is loaded and shown.

An import file can be imported only into a blank Graphic display.

Instructions for loading AutoCAD files

The graphic files created with AutoCAD exist in the Data Exchange Format (.DXF) and will be converted automatically into the Freelance Metafile Format (.DMF) during the loading process.

To be convertible, the AutoCAD version must be at least Release 10 or 11.

The following items from the full range supported by the AutoCAD language can be converted:

Shapes, polynets defined with the polyline item, B-Splines and 3D-Polylines, 3D-Face and viewport items are not convertible.

Line	Period	Circle	Arc	String
Solid	Text	Polyline	Block	
			(Macros)	

The DXF script size (font size) is converted according to the DMF coordinate sizes. The resultant font size is compared with the displayable script sizes defined in Freelance Engineering and assigned to the size most closely matching the size to be converted. The DMF text attribute “RefPoint, Start” is assigned to the DXF text attributes “Aligned” and “Adapt”.

Only text with rotation angles of 0, 90, 180 and 270 degrees can be converted properly; the closest angle is assigned in all other cases.

All AutoCAD elements are converted irrespective of their assigned layer. Individual layers cannot be blanked out.

Blocks that are rotated or reflected are not converted properly.

Instance objects (SECTION ENTITIES) of any type showing negative coordinates, are not converted. An exception here is the element objects of a block.

User Coordinate Systems (UCS), external references (XREF) and nested blocks (Insert instruction in block) are not supported.

During conversion, a log file with the file name DXF2DMF.LOG is created or updated. Non-convertible elements, non-supported objects and conversion errors are logged in this file. The path name of the DXF source and the line number within the DXF file are recorded, followed by an error description text.

Color conversion of AutoCAD files

In order to map AutoCad colors to Freelance colors a color conversion table which can, if necessary, be changed is entered in the Windows registry editor under the [ACADCOLORS] entry.

If no such entry exists, a standard conversion table is used which assigns only the AutoCAD color numbers 1-8 to the corresponding DMF color numbers. In this case, the DMF color black is assigned to the AutoCAD colors number 9 to 255.

The conversion tables consist of two components. The first entry in **Table Entries** denotes the number of color assignment entries to follow in the conversion table.

The color assignment entries have the following format:

col**xx**=lacadcolor,hacadcolor,dmfcolor

where:

xx	Index of the entry in the color assignment table; must be smaller than the **TableEntries** entry.
lacadcolor	Lower AutoCAD color number of the range to which the DMF color number is assigned. The lower limit is included in the range.

hacadcolor	Upper AutoCAD color number of the range to which the DMF color number is assigned. The upper limit is included in the range.
dmfcolor	Assigned DMF color number.

The following must be noted when changing the color assignment entries:

The index indicated by **xx** must be smaller than the value specified in the **TableEntries** entry. A color assignment table is always generated with *TableEntries* entries. **Lacadcolor** must be smaller or equal to **hacadcolor**, and they must be in the range between 0 and 255. Overlapping ranges should be avoided. See Appendix - Color table on page 190.

3.9.6 Exit the graphic editor

> **Editor** > **Close**,
> The graphic display tab is closed.

3.9.7 Copy, rename and delete graphic displays

Naming, renaming and copying a free graphic must be carried out in the Project tree.

3.10 Appendix - Color table

The following table lists the colors available for graphic displays.

The color tables have three entries for each color:

- Sequence number = display rank in the graphic editor,
- Internal color number, used, for example, when converting AutoCAD files into files for the graphic editor,
- Designator (name) used for the color in the graphic editor.

Color table (serial number, internal index, name)

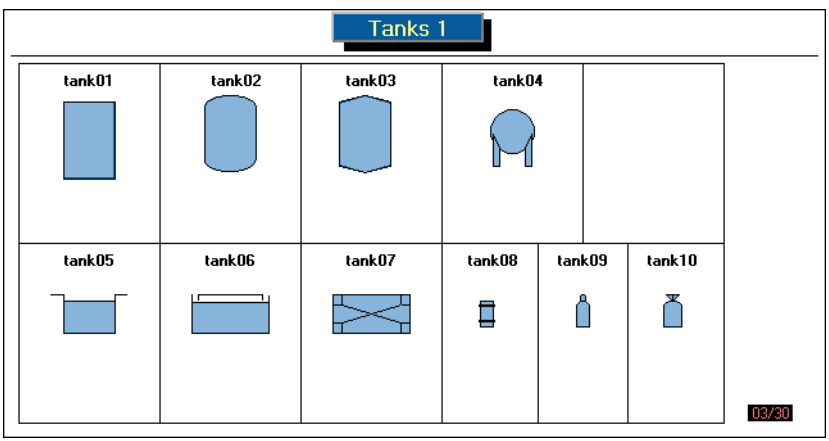
Static colors					
1	0	White	21	28	LightYellow
2	12	Grey93	22	29	Yellow
3	13	Grey80	23	30	MediumYellow
4	14	Grey68	24	31	DarkYellow
5	16	Grey58	25	1	LemonChiffon1
6	15	Grey48	26	2	LemonChiffon2
7	17	Grey35	27	73	LemonChiffon3
8	7	Black	28	3	LemonChiffon4
9	8	Lightblue	29	22	MistyRose1
10	9	MediumBlue	30	74	MistyRose2
11	10	Blue	31	23	MistyRose3
12	11	DarkBlue	32	24	MistyRose4
13	18	LightMagenta	33	76	LightPink
14	19	MediumMagenta	34	80	Pink
15	20	Magenta	35	77	MediumPink
16	21	DarkMagenta	36	78	DarkPink
17	4	LightGreen	37	25	LightPurple
18	5	MediumGreen	38	75	MediumPurple
19	72	Green	39	26	Purple
20	6	DarkGreen	40	27	DarkPurple

Message colors			**Signal colors**		
41	36	RGB1(PrioS1-3)	49	64	SigBlue
42	32	RGB2(Prio1)	50	65	SigCyan
43	33	RGB3(Prio2)	51	67	SigRed
44	34	RGB4(Prio3/4)	52	68	SigGreen
45	35	RGB5	53	69	SigDarkGreen
46	37	RGB6	54	70	SigYellow
47	38	RGB7	55	79	SigOrange
48	39	RGB8	56	190	SigMagenta
			57	66	SigBrown

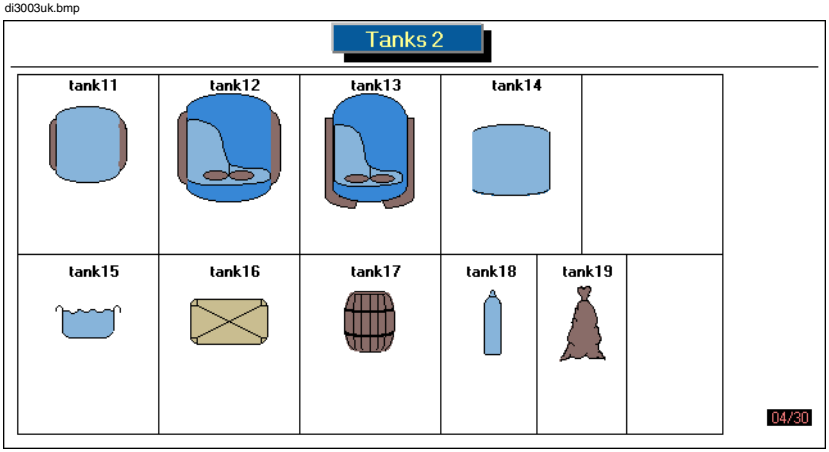
Media colors			**Free colors**		
58	44	Flash1(PrioS1-3)	86..104	144..162	Grey1..Grey19
59	40	Flash2(Prio1)	105..123	163..181	Blue1..Blue19
60	41	Flash3(Prio2)	124..139	48..63	Cyan1..Cyan16
61	235	RGB3(Prio2alt.)	140..142	232..234	Cyan17..Cyan19
62	42	Flash4(Prio3/4)	143..161	100..118	Magenta1..Magenta19
63	236	RGB4(Prio3alt.)	162..180	81..99	Green1..Green19
64	43	Flash5	181	119	Yellow1
65..67	45..47	Flash6..Flash8	182..196	129..143	Yellow2..Yellow16
68..76	120..128	Flash9..Flash17	197..199	191..193	Yellow17..Yellow19
77..84	182..189	Flash18..Flash25	200..218	213..231	Brown1..Brown19
85	71	Flash26	219..237	194..212	Red1..Red19
			238		Bluish grey: Faceplate

Media colors			Free colors		
			239		Bluish grey: Operation
			240		Bluish grey: Animate
			241		Button color

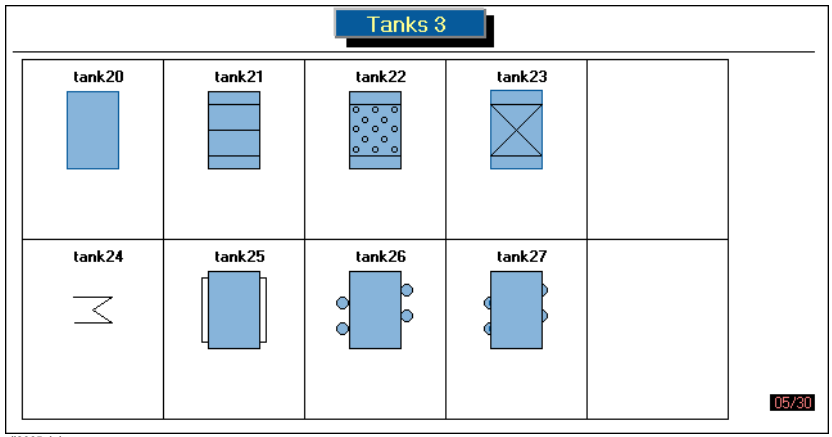
3.11 Appendix - Graphic macro library



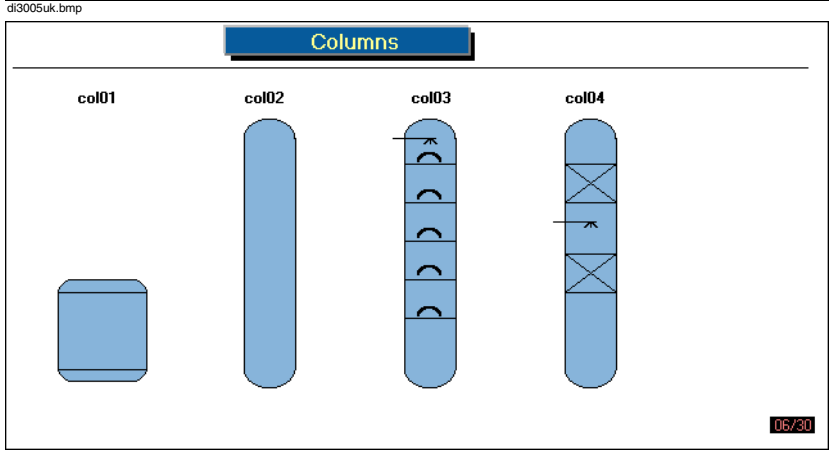
di3003uk.bmp



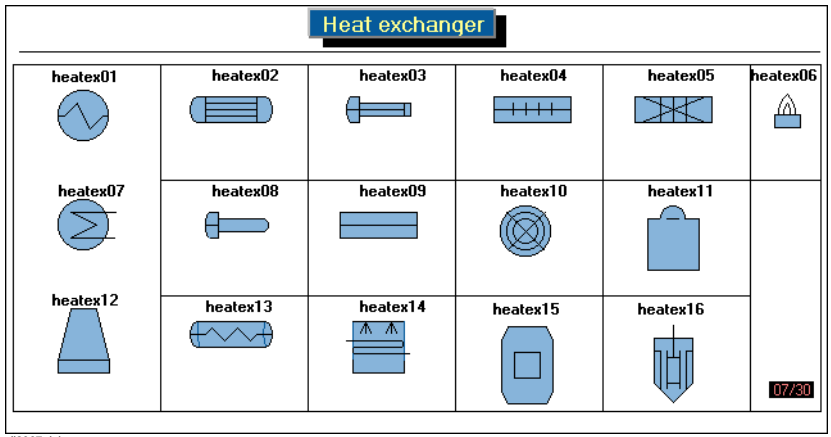
di3004uk.bmp



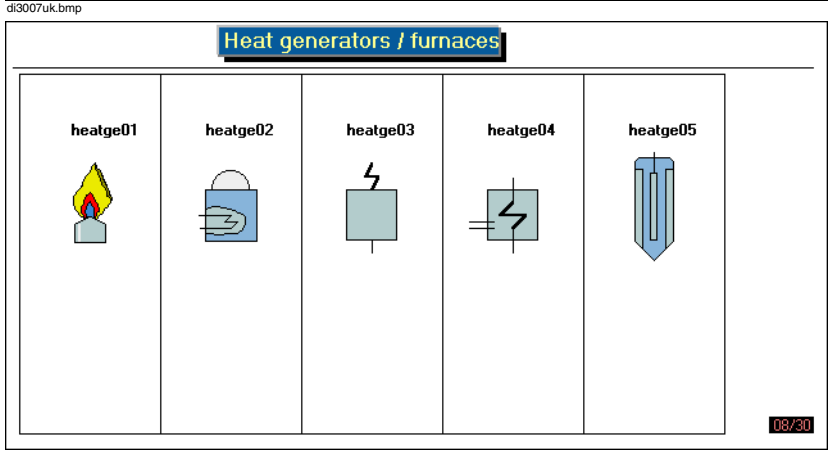
di3005uk.bmp



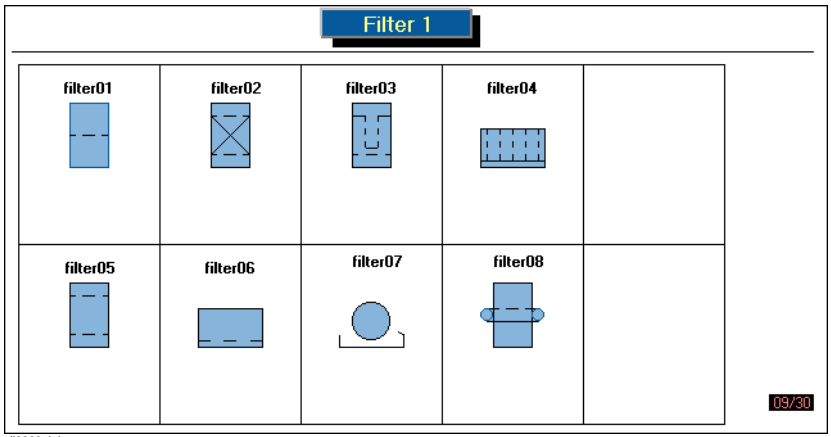
di3006uk.bmp



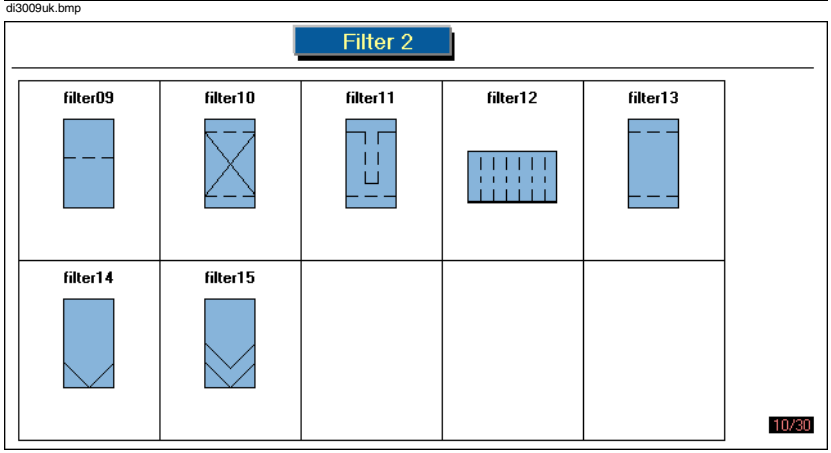
di3007uk.bmp



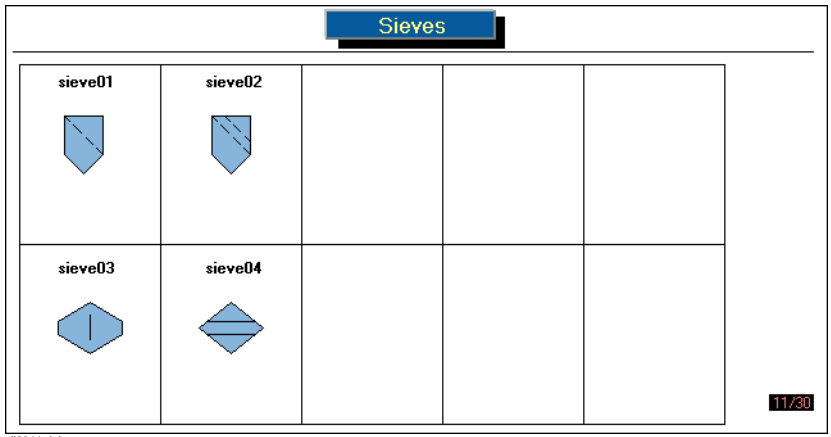
di3008uk.bmp



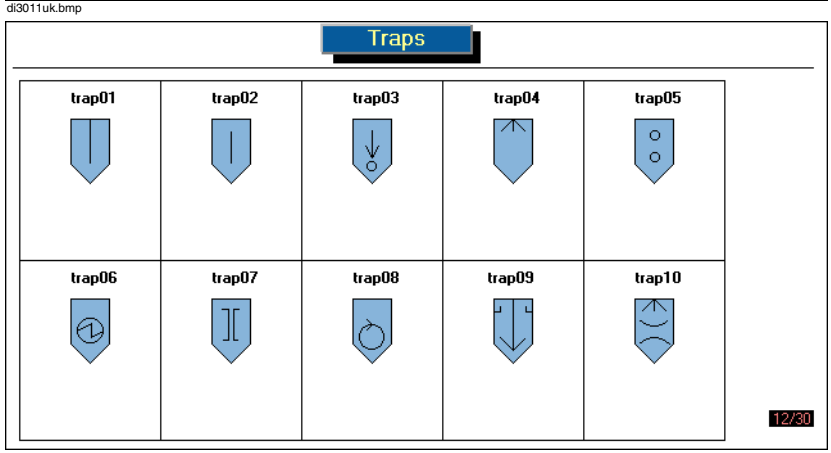
di3009uk.bmp



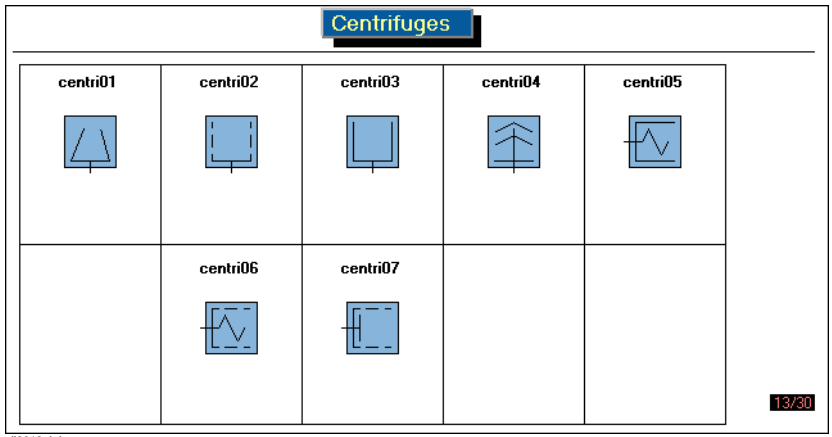
di3010uk.bmp



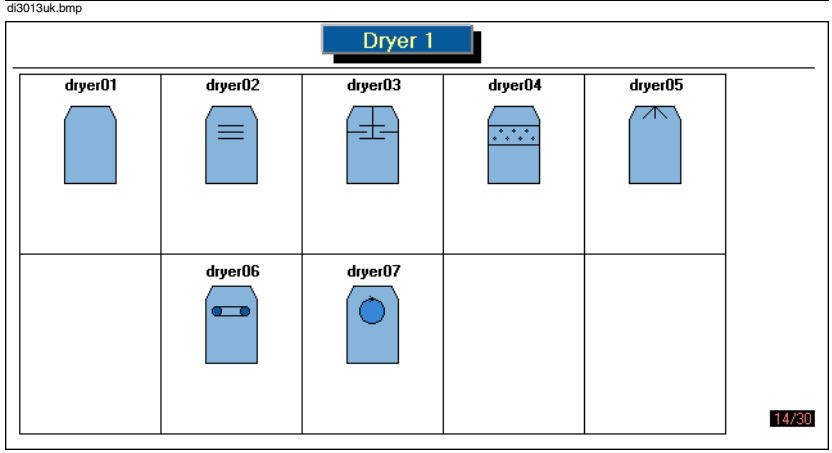
di3011uk.bmp



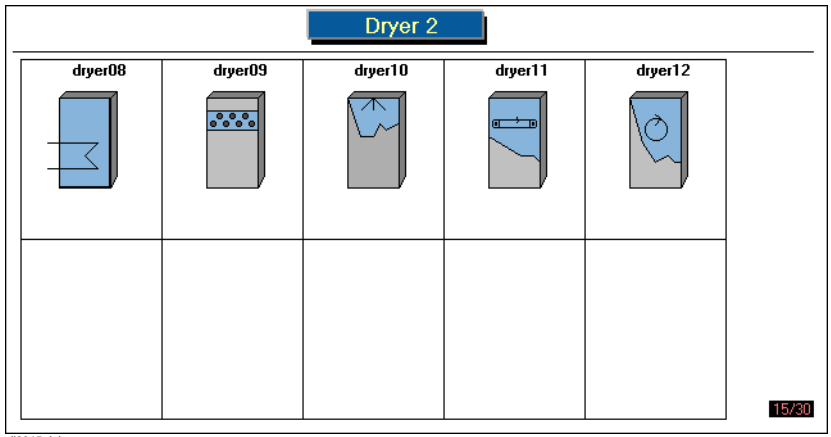
di3012uk.bmp



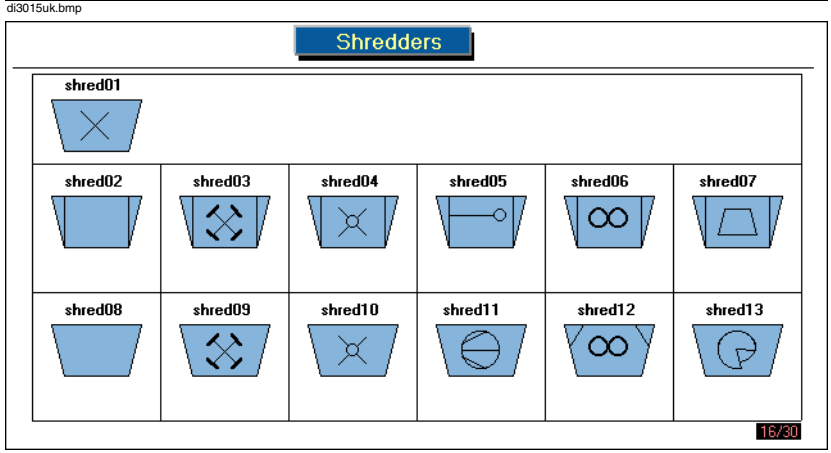
di3013uk.bmp



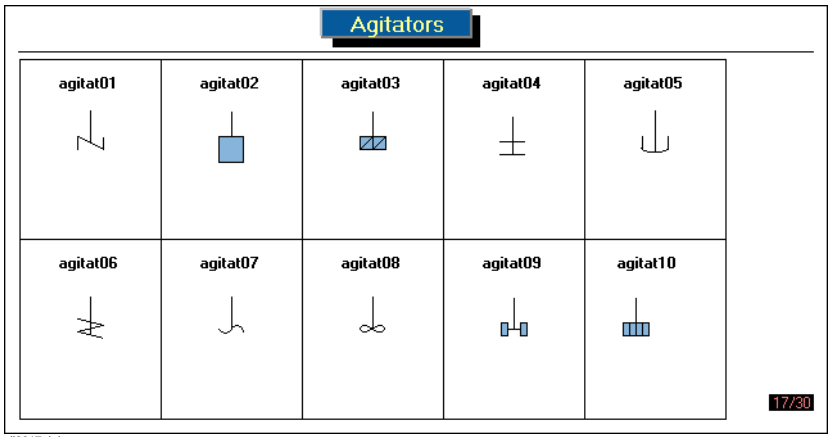
di3014uk.bmp



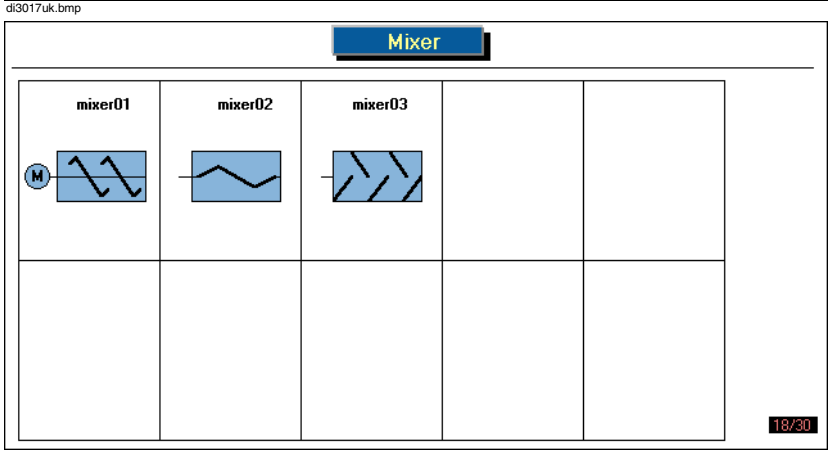
di3015uk.bmp



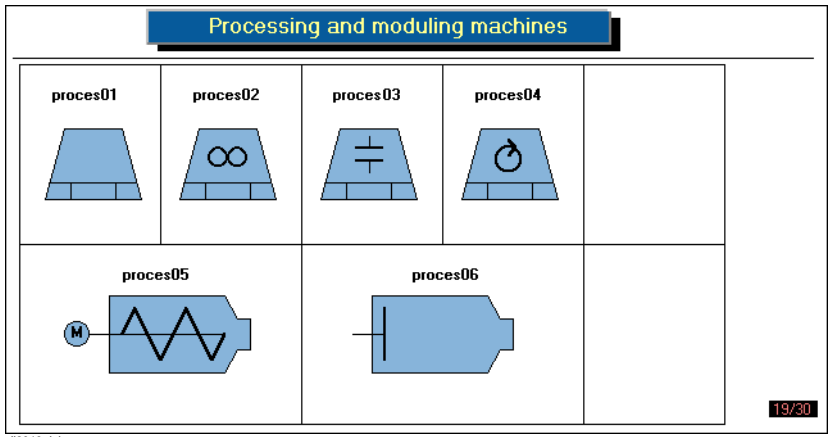
di3016uk.bmp



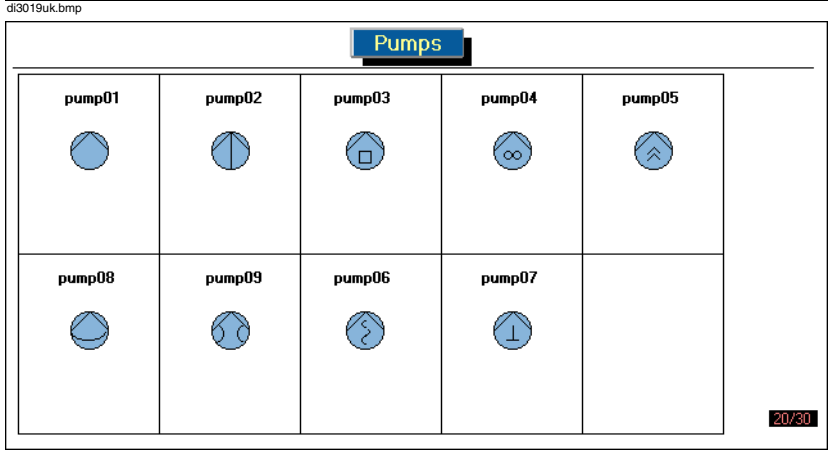
di3017uk.bmp



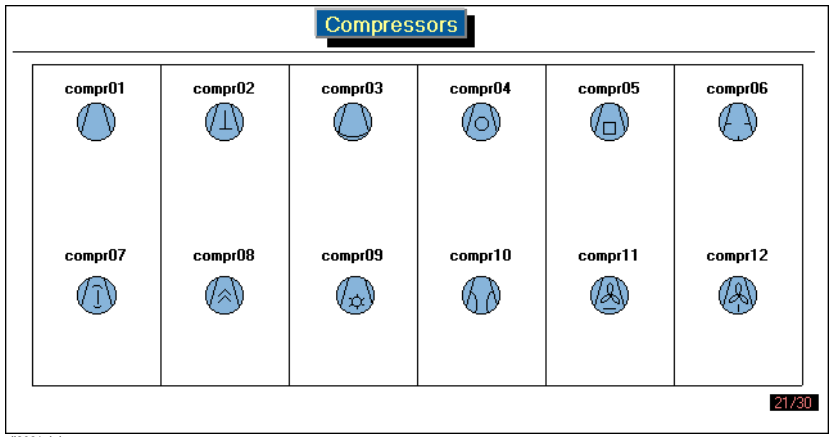
di3018uk.bmp



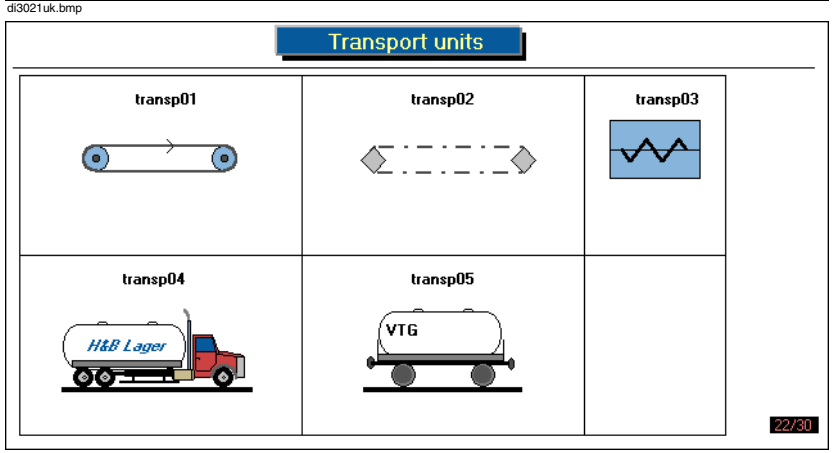
di3019uk.bmp



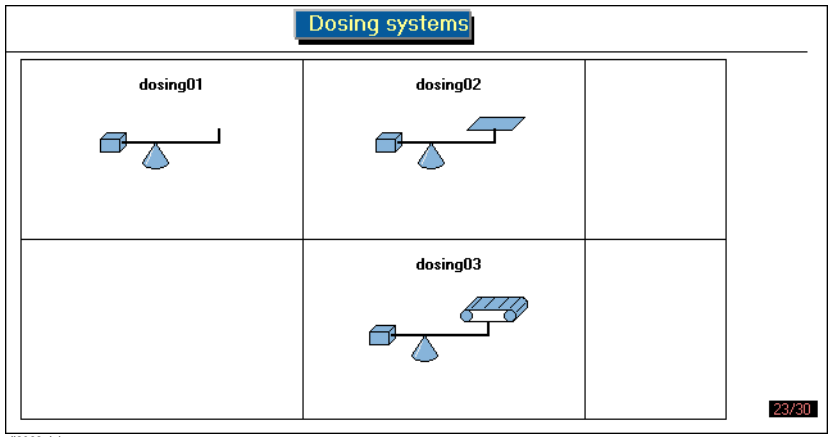
di3020uk.bmp



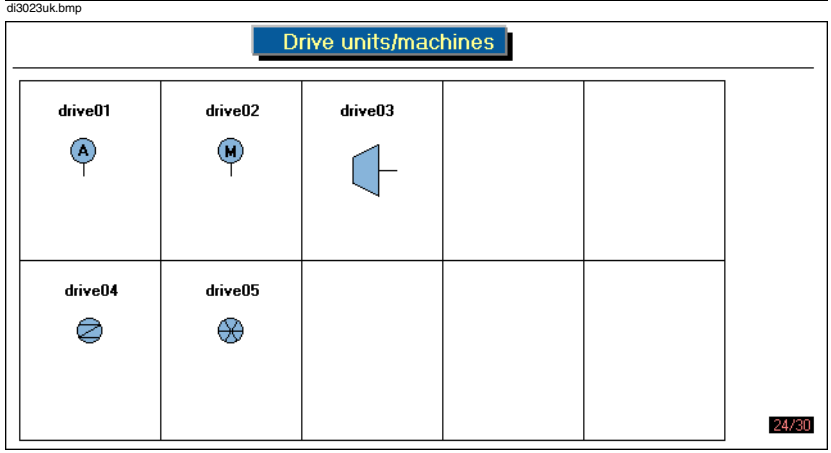
di3021uk.bmp



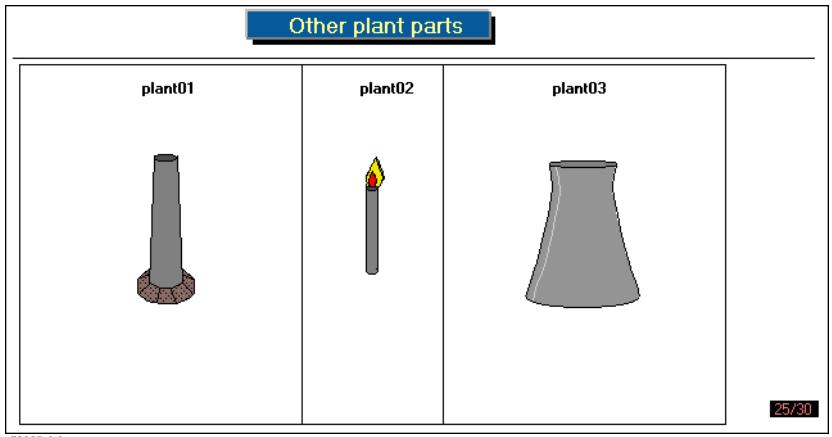
di3022uk.bmp



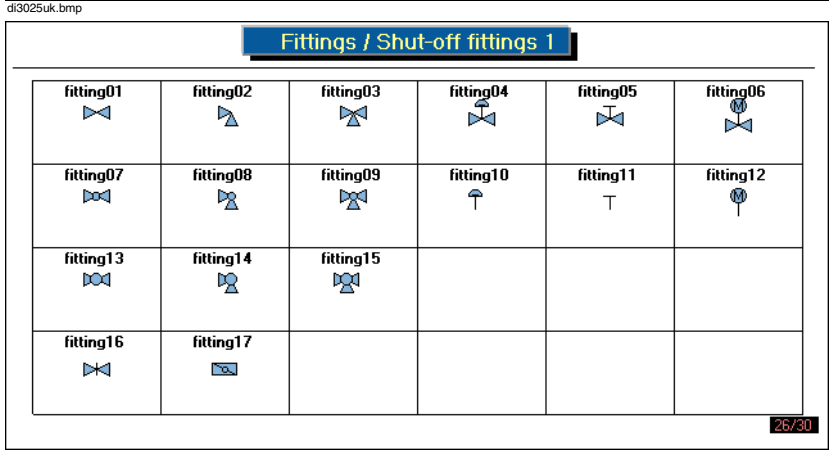
di3023uk.bmp



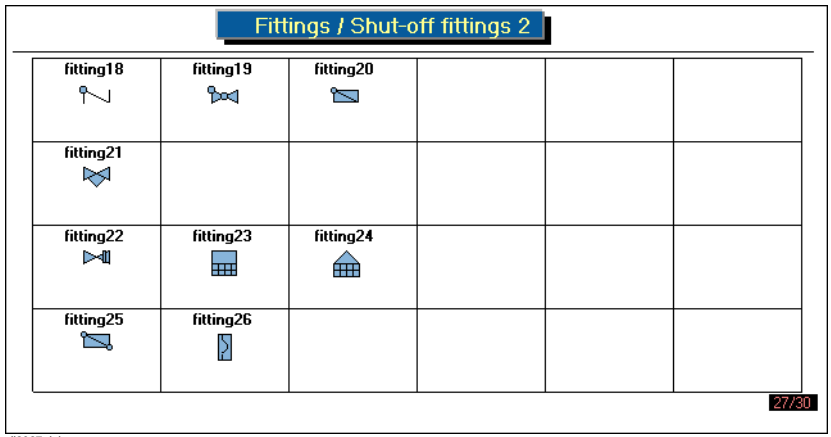
di3024uk.bmp



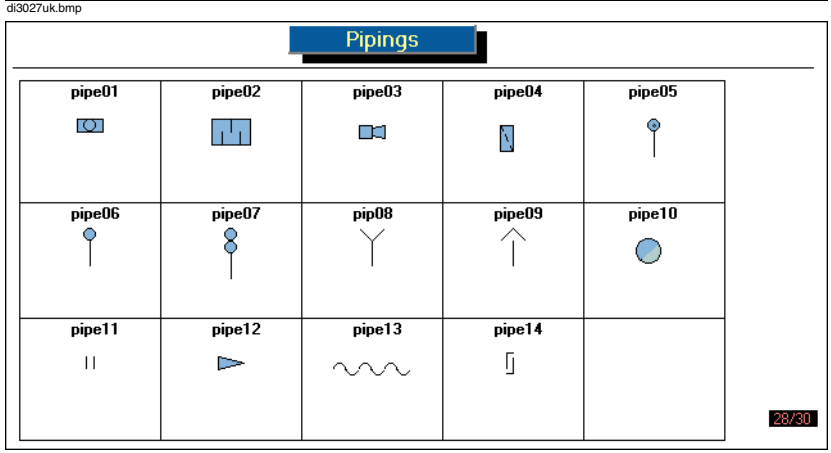
di3025uk.bmp



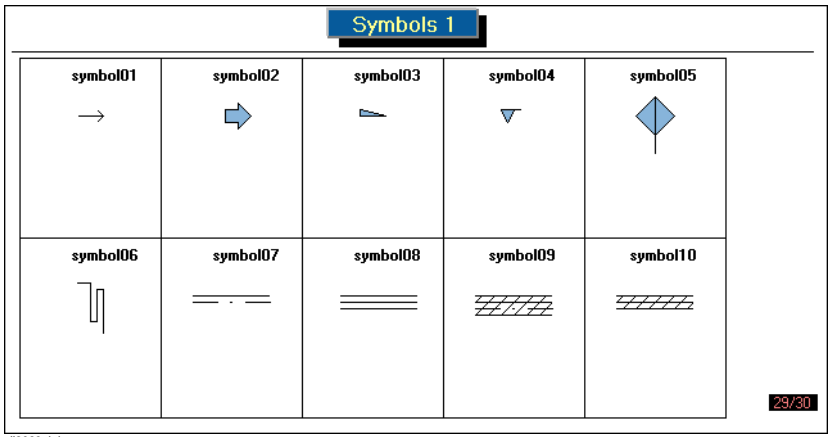
di3026uk.bmp



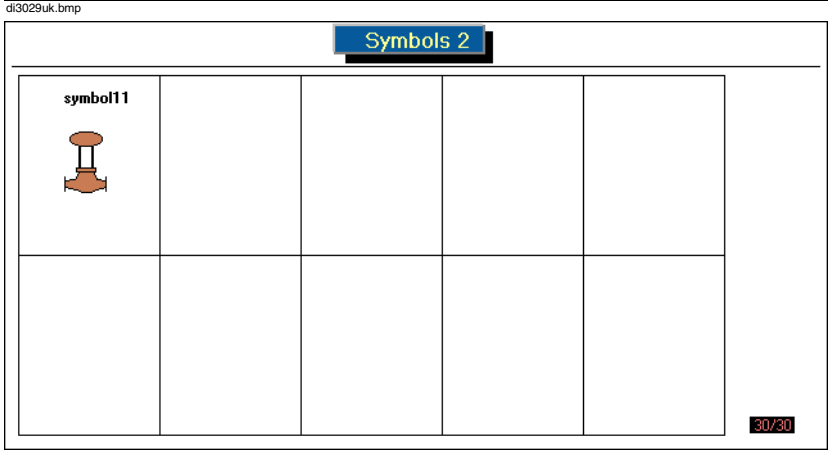
di3027uk.bmp



di3028uk.bmp



di3029uk.bmp



di3030uk.bmp

A file containing the complete set of graphic objects can be found in the Freelance software CD at the location **\LANG\US\Bonus\3dlib**.

4 Logs

4.1 General description of logs

Logs are used for displaying and permanently logging information and messages from the process and from the Freelance system. Logs are output on a printer, screen or storage device (through data transfer). A distinction is made between two different types of log – event logs and state logs.

4.1.1 Event logs

Event logs are used for logging events such as **messages, faults, switching activities** and **operator actions** (including user names, if **Security lock** installed). Logging is effected spontaneously when an event occurs.

The **signal sequence log** is used for acquisition of events and is therefore classified with the event logs. A further distinction is made between **signal sequence log 1** and **signal sequence log N**. Data of signal sequence log 1 are output continuously on a printer. By contrast, data of the signal sequence log N are output only on completion of logging or per manual intervention.

Various different types of messages can be logged: process messages and system messages are generally used to indicate events and faults, while a sequence of event log can be used to log switching events in the field with a resolution of 2 ms.

4.1.2 State logs

State logs are used for cyclic logging of process states. These include the cyclic acquisition of the state of a tag or the logging of sequences within the process.

The disturbance course log, the operation log and the Excel report are classified as state logs. The disturbance course log uses a special disturbance course log acquisition module from the process station. The module acquisitions cyclically the

input signals and saves them in a ring buffer of **maximum 200** values per input signal.

4.1.3 Logs in an operator station

A maximum of four operation logs, four disturbance course logs, one signal sequence log 1, three signal sequence logs N and any amount of Excel reports can be set up for each Operator station (The display and operation of the logs on an Operator station is described in the ***Operators Manual Freelance Operations***).

The various logs are all programs in the Operator station resource of the Project tree. Logs can be set up, deleted, moved and copied in the Project tree.

4.1.4 Sequence of events

In certain applications there is a requirement to log selected binary signals with a time stamp in correct chronological order.

In order to achieve this end, the 'Time stamp' function must first be activated in a DDI 001 module (see ***Engineering Manual***, ***Communication and Fieldbusses***, ***Rack Modules***). When this function is activated, an extra binary value and time value for each channel are made available at the output of this hardware block in addition to the 'standard' 32 binary outputs. When there is an edge change of the binary value on these outputs, the current value and the associated time (resolution = update cycle of the module) are stored for each channel.

In an FBD program a function block 'Sequence of events monitoring M_SOE' must be configured (see ***Engineering Manual***, ***Functions and Function Blocks***, ***Monitoring function blocks***). This block can be used to transfer binary values with time stamp of a DDI 01 to a signal sequence log. In addition, during parameterization a DDI 01 block is assigned to this block, and the channels to be monitored are defined.

With each cycle of the user task the binary values and time stamps of the DDI 01 block are read. When the stored binary values are read and time-stamped, the timestamp function in the DDI 01 module is re-activated, that is, the next edge change of this binary value can be detected and stored.

For each change of value of a monitored channel that is detected in the M_SOE function block, a message is generated using the binary value and the associated time stamp; this signal can then be processed further in the signal sequence logs.

These messages are not displayed in the Freelance Operations message line or message list.

Active log files of any type of log must not be deleted manually by the user from the Freelance data folder. If an active log file is deleted, the respective log go to Emergency mode or will be disturbed.

4.2 Signal sequence log

4.2.1 Create signal sequence log

A Signal sequence log is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

> Select an Operator station resource or the Common display pool (P-CD) in the Project tree

> **Edit > Insert next level > Signal sequence log**

Or

Right-click > **Insert > next level > Signal sequence log**

If a signal sequence log is configured in the Common display pool (P-CD), this signal sequence log will be available in all Operator stations.

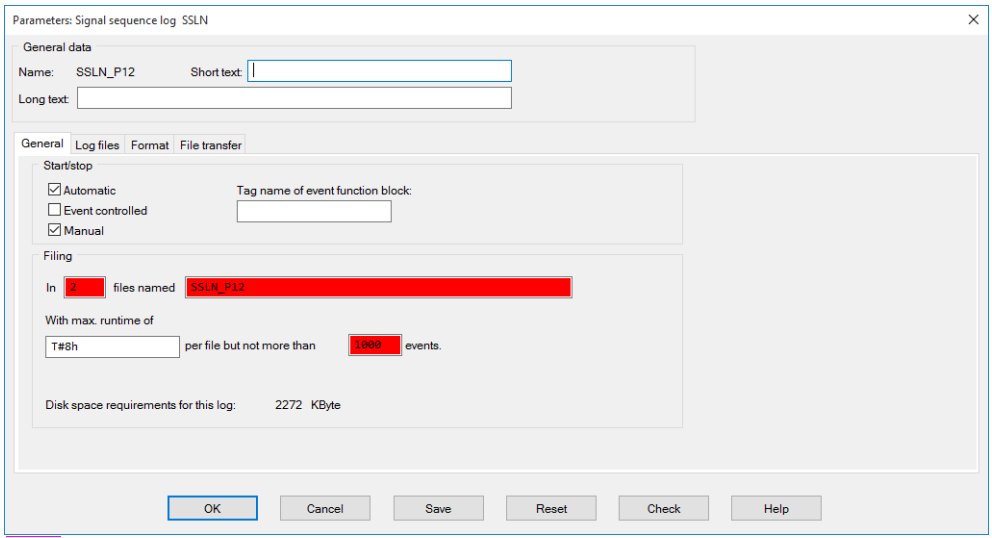
4.2.2 Configure signal sequence log

> Double-click the name of the **Signal sequence log** in the Project tree

The definition of parameters for signal sequence log 1 or signal sequence log N is virtually identical; they are therefore described together. Where differences do arise, these are shown separately.

The configuration of the signal sequence logs 1 and N consists of a parameter definition dialog with 4 tabs.

4.2.3 General data tab - Signal sequence log 1 and N



SSLN.png

General data

Name The **name** of the signal sequence log. The name has been fixed in the Project tree and **cannot** be changed here.

Short text A **Short text** can be assigned to the signal sequence log. Up to 12 characters can be entered.

Long text A **Long text** can be assigned to the signal sequence log. Up to 30 characters can be entered.
Short and long text are output with the documentation of the project. In addition these texts can be **configured for the header and footer of the printed log,** see Header and footer lines in logs on page 238.

Start/Stop

Automatic Logging is automatically started by starting Freelance Operations.

Event controlled
Logging is started and stopped by an event.

Tag name of event function block
Name of event starting logging, ***Engineering Manual Functions***

and Function Blocks, Monitoring function blocks. Press the function key **F2** to open a selection list.

Manual The operator at the Operator station can start and stop logging.

Filing

in .. files Specifies the number of log files which are created on the operator station PC. The value must be between 1 and 400.

named The name of the log file, which is filed on the operator station PC hard disk. The preset name can be accepted, or a new one given.

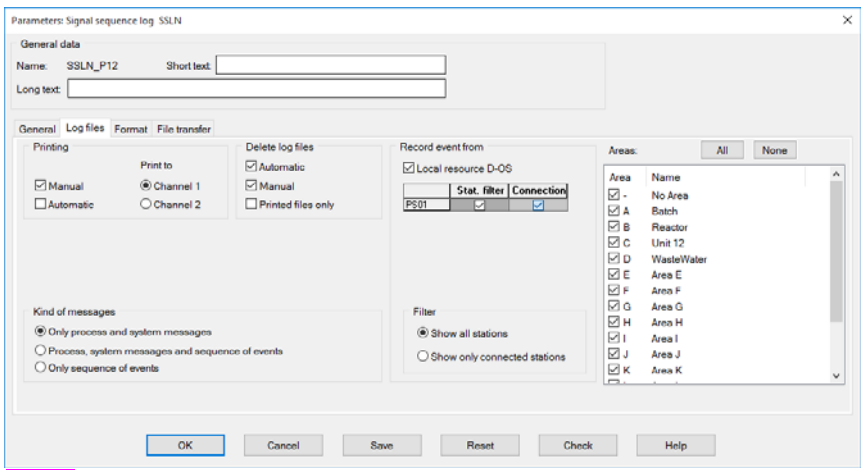
With max. runtime of ... per file
The recording period per log file can be defined with this field. Entries are made in the IEC 1131-3 format. The value must be between 0 and 2147483 s.
Example: T#2147483s or T#24d20h31m23s

but not more than ... events
The value must be between 3 and 32767. Default 1000 events.

Disk space requirements for this log
The size which log files can attain is displayed in this field. This amount of storage should be available on the operator station PC.

The log file size should not exceed 1 Gbyte in order to limit the Freelance Operations load time.

4.2.4 Logs tab – Signal sequence log 1 and N



Logs tab.png

Print

Manual The printing of logs can be activated **manually** by the operator at the Operator station.

Print to Channel 1/2

Two printer channels are available for log output on the printer. The printer channel is selected by activating the corresponding *option* button.

Signal sequence logs should always be printed on a line printer, otherwise the formatting may not be correct.

Delete log files

Automatic When the **automatic** delete option is selected and the configured number of files is exceeded, the oldest log file is overwritten by the current file.

If the automatic delete option is not selected then logging is suspended as soon as the maximum number of files has been reached.

Manual The operator can select and delete individual log files.

Record event from
Local resource D-OS
Events on the Operator station are logged. These include events such as switching operations and operator actions.

Stat. filter ☑ Activates logging of events such as messages and faults on the corresponding resource.

Connection ☑ Indicator showing that a connection is configured to the corresponding Operator station.

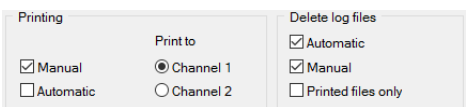
Filter Either all configured stations or only connected stations are included in the events selection list.

Areas Messages from the selected areas are set in the signal sequence log. For easier pre-configuration, the buttons “All” and “No” can be used to activate or deactivate all plant areas.

Kind of messages
Configures which messages are to be recorded in the log: process messages, system messages and sequence of events.

Enhancements to parameter definition dialog 2 in signal sequence log N

Unlike signal sequence log 1, data of signal sequence log N are **not** printed **continuously**. Hence the parameter definition dialog 2 differs from signal sequence log 1.



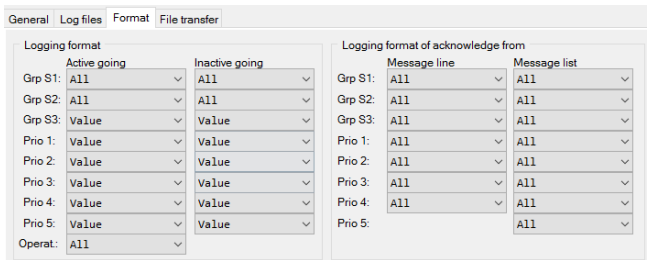
Enhancements.png

The following virtual keys are to choose additionally:

Printing
Automatic Printing takes place automatically after completing the logging.

Delete log files
Printed files only
Only printed log files can be deleted manually.

4.2.5 Format tab – Signal sequence log 1 and N



Format tab.png

Logging format

Active going/Inactive going
: A separate log can be configured for active going and inactive going messages.

Empty
: No logging

Value
: Value-based output format for messages (no display of long text)

Long text
: Long text-based output format for messages (no display of process value and dimension)

All
: Combined output of value-based and long text-based format (only allowed for 132 characters per line)

Operat.
: If operator actions should be logged, a format other than **Empty** must be selected.
If the optional program Security lock is installed on the Operator station, the logged user name at this particular time will also listed during the logging of every operator action.

Logging format of acknowledge from

Message line/list
: The format for a message acknowledgment is ascertained separately according to the place of acknowledgment – message line and message list.

Page layout
: Defines page layout for the printout. The Lines per page must be entered, and is between 10 and 100 lines. The number of characters

per line can be defined as 80 or 132 characters, according to the paper format.

Select the appropriate line length according to the connected line printer.

When specifying a line length of 80 characters and using tag names with a length of 16 characters, the time stamp will be printed without a separator, i.e. “hhmmssmssS” will be printed instead of “hh:mm:ss.mssS”.
Example: 12:30:24:333 will be printed as 123024333.

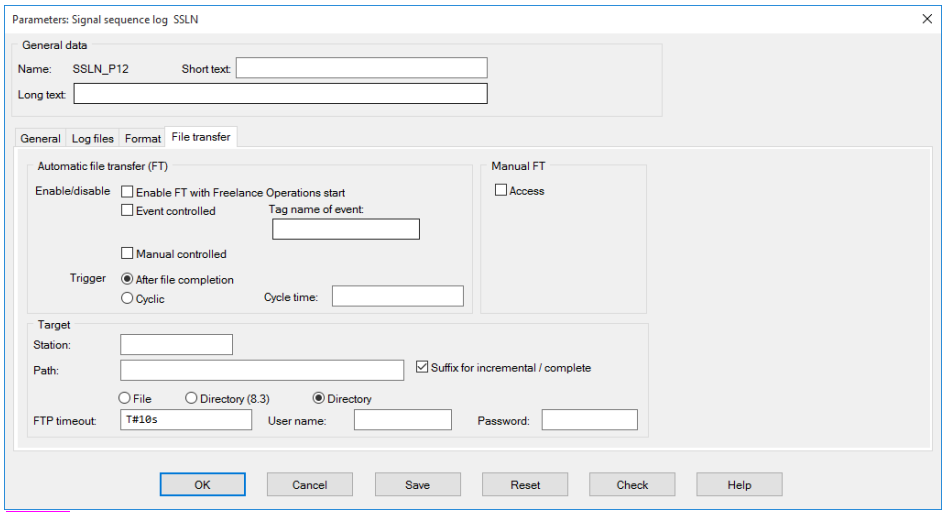
Header/Footer

The contents of the log **header** and **footer** are freely definable. They can include both static text and dynamic process variables. There is also a collection of globally preset variables. The default is a commonly used form of the layout. See Header and footer lines in logs on page 238.

Changes in the header and footer lines generally lead to a change in size of the log. When the log is downloaded to the operator station, the file size is checked. A log whose file sizes have been changed is treated as new log. All existing log files are renamed, and therefore no longer displayed in Freelance Operations. The files may only be viewed using the Archive Browser.

4.2.6 File transfer tab – Signal sequence log 1 and N

Defining parameters for the signal sequence log through parameter definition dialog 4 includes copying the stored logs to other data carriers, primarily external devices, for data protection and archiving purposes.



SSL-FT.png

File transfer

Specifies whether and how a copy of the log file is to be transferred from the operator station PC to another PC. The PC selected to receive the archives must have a network communication link to the operator station PC and a FTP server must be installed.

Archives are usually sent to a target station which is not identical with the operator station PC. A further possibility is to export the archive files to a Windows drive on the operator station PC. This drive can be mapped on to another PC in the Windows network. In this case the station address is its own TCP-IP address.

The Freelance component **Archive Browser** can be used on the archiving PC to **visualize the log archives and convert them** to CSV format.

Automatic file transfer (FT)

The mode of file transfer enabling or disabling is specified.

Enable/disable

Enable FT with Freelance Operations start

☑ As soon as Freelance Operations is started, file transfer is enabled.

☐ File transfer is not automatically enabled when Freelance Operations is started.

Event controlled

☑ File transfer is enabled or disabled depending on the status of the event module entered. It is mandatory to specify an event module.

Tag name of event

Press the function key **F2** to open a selection list with event function blocks.

Manual controlled

☑ The operator at the Operator station can enable or disable file transfer.

☐ File transfer cannot be enabled or disabled manually.

Trigger This area in the parameter dialog is used for specifying how data transfer is to be triggered.

After file completion

◉ Every completed file is immediately transferred. This mode is the default setting for the signal sequence log.

Cyclic, Cycle time

◉ This time parameter is used to specify the cyclical time interval between copies of the log file being written to the specified target station. Entered in time format (for example, T#10h).

Manual FT

Access

☑ The operator at the Operator station can start the file transfer at any time by pressing the ***File trans.*** button.

☐ File transfer cannot be started spontaneously. The **FILE TRANS** button in the signal sequence log operation in Freelance Operations is disabled.

Target The **target for the data to be transferred** should be specified here. Ideally the target station will also have the Archive Browser software installed on it, so that the trend and log archive files can be displayed and further processed.

Station IP address of the target computer. If the **operator station PC is to be used as export target**, its own IP address must be entered here.

Path If the archive files are to be copied to a certain directory, the complete directory name must be specified here. When using the Internet Information Services on the target station, a path preselection is possible so that only a backslash \ is entered, possibly followed by the rest of the path branch. For example, the path C:\ARCHIVE\STATION\SSL for the target computer can mean that it diverts all received archives to the preset path C:\ARCHIVE, and the incoming archive contributes the path information \STATION\SSL.

It should be noted that when transferring data the target computer is responsible for any additional manipulation of the files. The copied file is only temporary and is overwritten the next time the corresponding archive is exported.

The target path to the archive storage must be present and may not be write-protected.

File The export files are stored with the file name entered under Target path.
Example: STATION\SSL\SSL_MANUFACTURE. This file is overwritten in every export. Path and file name together may have a total length of 100 characters.

Directory [8.3] The files are exported with a generated file name that corresponds to the export date in the format “YMMDDhhm.mss”, for example, 30528162.320.

The file name contains no information about the archive type. Choose a suitable path name to ensure it is recognizable afterwards.

Directory The export files are stored in the directory shown under Target path with their original name (from parameter definition dialog 1). The export date in the format ‘.YYMMDDHHmmss’ is also appended to the name (separated by a period).
Example: SSL_MANUFACTURE.130528162.320. Path and file name together may have a total length of 100 characters.

Suffix for incre- mental/complete

☑ In order to distinguish between files containing complete data

sets and those containing incremental data sets, the suffixes '**_INC**' or '**_FULL**' are appended to the basic file names. This extension renders it impossible for files to be lost by overwriting one another.

FTP timeout	FTP utilities are synchronous utilities. In order to prevent the system from becoming congested a maximum time should be entered here within which a transfer must be completed. If this value is exceeded, it causes a system alarm in Freelance Operations.
User name	Enter a user name which is known to the FTP server of the target station.
Password	The password corresponds to the user password for the target station.

4.3 Disturbance course log

4.3.1 Create disturbance course log

A Disturbance course log is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

> Select an Operator station resource or the Common display pool (P-CD) in the Project tree

> **Edit** > **Insert next level** > **Disturbance course log**

Or

Right-click > **Insert** > **next level** > **Disturbance course log**

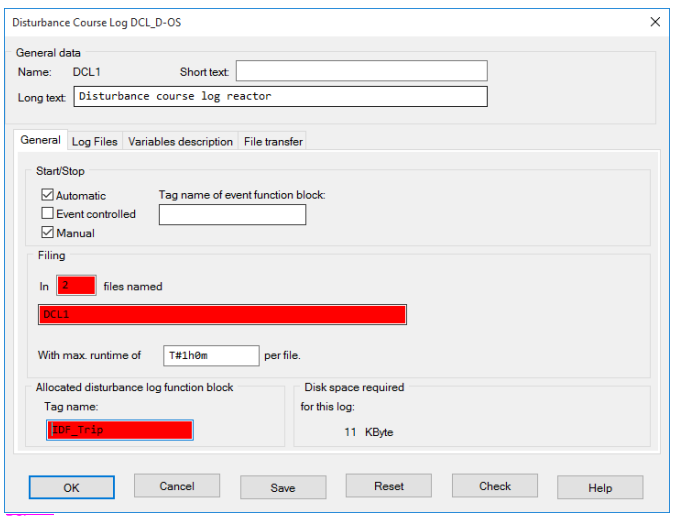
If a Disturbance course log is configured in the Common display pool (P-CD), this Disturbance course log will be available in all Operator stations.

4.3.2 Configure disturbance course log

> Double-click the name of the **Disturbance course log** in the Project tree

The configuration of a disturbance course log consists of a parameter dialog with 4 tabs.

4.3.3General tab - Disturbance course log



DCL.png

General data

Name The Name of the signal sequence log. The name has been fixed in the Project tree and **cannot** be changed here.

Short text A **Short text** can be assigned to the signal sequence log. Up to 12 characters can be entered.

Long text A **Long text** can be assigned to the signal sequence log. Up to 30 characters can be entered.
Short and long text are output with the documentation of the project. In addition these texts can be **configured for the header and footer of the printed log,** see Header and footer lines in logs on page 238.

Start/Stop

Automatic Logging is automatically started by starting Freelance Operations.

Event controlled
Logging is started and stopped by an event.

Tag name of event function block
Name of event starting logging, see ***Engineering Manual***, ***Functions and Function Blocks***, ***Monitoring function blocks***. Press the function key **F2** to open a selection list.

Manual The operator on the operator station can start and stop logging.

Filing

in .. files Specifies the number of log files which are created on the operator station PC. The value must be between 1 and 400. Exactly one disturbance course is logged in each file.

named the name of the log file, which is filed on the operator station PC hard disk. The preset name can be accepted, or a new one given.

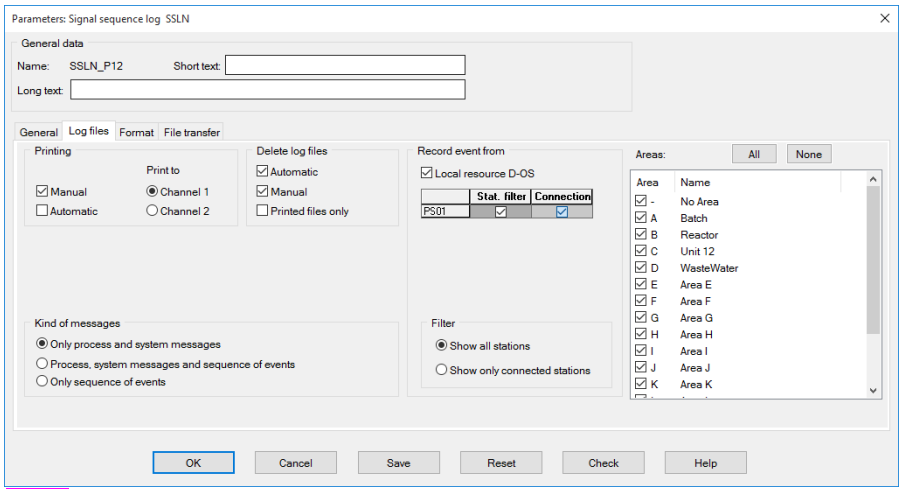
with max. runtime of ... per file
The recording period per log file can be defined with this field. Entries are made in the IEC 1131-3 format. The value must be between 0 and 2147483 s.
Example: T#2147483s or T#24d20h31m23s

Allocated disturbance log function block
Name of log acquisition module (see ***Engineering Manual***, ***Functions and Function Blocks***, ***Acquisition blocks***). Press the function key **F2** to open a selection list.

Disk space required
The size which log files can attain is displayed in this field. This amount of storage should be available on the operator station PC.

The log file size should not exceed 1 Gbyte in order to limit the Freelance Operations load time.

4.3.4 Logs tab - Disturbance course log



Log tab.png

Delete log files

Automatic When the **automatic** delete option is selected and the configured number of files is exceeded, the oldest log file is overwritten by the current file.

If the automatic delete option is not selected then logging is suspended as soon as the maximum number of files has been reached.

Manual The operator can select and delete individual log files.

Printed files only

Only printed log files can be deleted manually.

Page layout Defines page layout for the printout. The number of **Lines per page must** be entered and is between **10 and 100 lines**. The number of characters per line can be defined as **80 or 132 characters**, according to the paper format.

Header/Footer

The contents of the log **header** and **footer** are freely definable. They can include both static text and dynamic process variables. There is also a collection of globally preset variables. The default is

a commonly used form of the layout. See Header and footer lines in logs on page 238.

Changes in the header and footer lines generally lead to a change in size of the log. When the log is downloaded to the operator station the file size is checked. A log whose file sizes have been changed is treated as new log. All existing log files are renamed, and therefore no longer displayed in Freelance Operations. The files may be viewed using the Archive Browser.

Print to

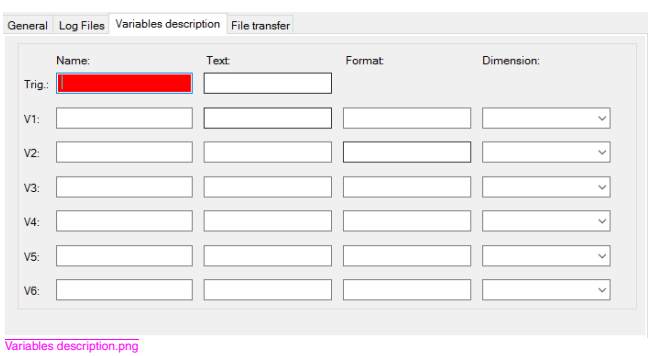
Channel 1/2 Two printer channels are available for log output on the printer. The printer channel is selected by activating the corresponding *option* button.

Printing

Manual The printing of logs can be activated manually by the operator at the Operator station.

Automatic Printing takes place automatically after completing the log.

4.3.5 Variables description tab - Disturbance course log



Variables description.png

No plausibility check is performed on the entries in this tab as the trigger and variables are configured permanently with the acquisition function block. Details included here serve only to provide information and are included in the log when it is printed out.

Parameters trigger (Trig:)

The time of acquisition of the variables to be parameterized is based on the configured signal situation on the disturbance course log acquisition module.

Name **Name** of the variable that triggers the switch on the disturbance course log acquisition module. This name appears for information only and is included in the printout. It is not evaluated further as the acquisition modules trig input bears this responsibility. Even if the trigger is not actuated by a variable, a text must be entered here.

Text **Text** that will be output as a comment after the name of the trigger variable.

Parameters variable specification (V1: - V6:)

Up to six variables can be configured for data acquisition for the disturbance course log. The number of variables is limited by the inputs in the disturbance course acquisition module.

V1 ... V6

Name Name of the variable on the process station. This information will appear in each printed log.

Text Text output on logging the variable.

Format Required for output of variables in the log (see **Select and create custom formats** on page 136).

Dimension The dimension assigned to the variable. The dimension is output with the variable value during logging.

4.3.6 File transfer tab – Disturbance course log

This parameter definition dialog corresponds to the parameter definition dialog of the **Signal sequence log**, see File transfer tab – Signal sequence log 1 and N on page 215.

4.4 Operation log

4.4.1Create operation log

An Operation log is created and edited in the Project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration***, ***Project tree***.

> Select an Operator station resource or the Common display pool (P-CD) in the Project tree

> **Edit** > **Insert next level** > **Operation log**

Or

Right-click > **Insert** > **next level** > **Operation log**

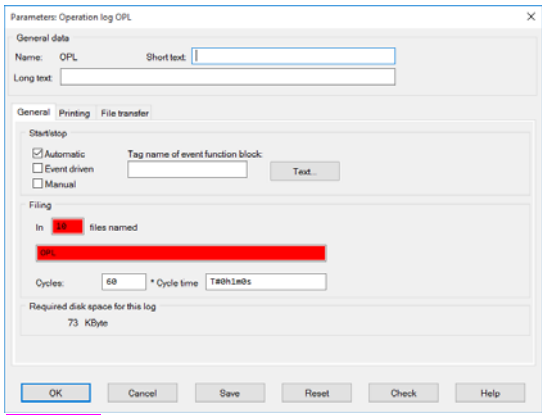
If an Operation log is configured in the Common display pool (P-CD), this Operation log will be available in all Operator stations.

4.4.2 Configure operation log

> Double-click the name of the **Operation log** in the Project tree

The configuration of an operation log consists of a parameter dialog with 3 tabs.

4.4.3General tab – Operation log



Operation log.png

General data

Name The **name** of the signal sequence log. The name has been fixed in the Project tree and **cannot** be changed here.

Short text A **Short text** can be assigned to the signal sequence log. Up to 12 characters can be entered.

Long text A **Long text** can be assigned to the signal sequence log. Up to 30 characters can be entered.
Short and long text are output with the documentation of the project. In addition these texts can be configured for the header and footer of the printed log, see Header and footer lines in logs on page 238.

Start/Stop

Automatic Logging is automatically started by starting Freelance Operations.

Event driven
Logging is started and stopped by an event.

Tag name of event function block
Name of event to start logging, see ***Engineering Manual***, ***Functions and Function Blocks***, ***Monitoring function blocks***.
Press the function key **F2** to open a selection list.

Manual The operator on the operator station can start and stop logging.

Text... Configuration operation log text, see Text layout on parameter definition dialog – Operation log on page 228.

Filing

in .. files Specifies the number of log files which are created on the operator station PC. The value must be between 1 and 400.

named The name of the log file, which is filed on operator station PC hard disk. The preset name can be accepted, or a new name can be provided.

Cycles With the start of logging, the data is written cyclically to the file according to the entered cycle time. The value must be between 1 and 32767.

Cycle time This field specifies the interval between two recordings. Entries are made in the IEC 1131-3 format. The value must be between 1 and 2147483 s.
Example: T#2147483s or T#24d20h31m23s.

The recording time in a file is calculated from the number of cycles * cycle time.

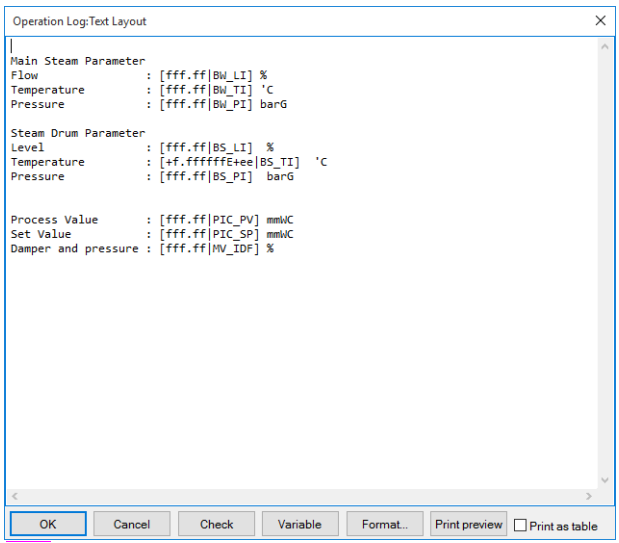
Required disk space for this log

The size which log files can attain is displayed in this field. This amount of storage should be available on the operator stations PC.

The log file size should not exceed 1 Gbyte in order to limit the Freelance Operations load time.

4.4.4 Text layout on parameter definition dialog – Operation log

> Press **Text...**



Text.png

Parameter definition dialog **Text** comprises a **text field** and an **operator line**. In the text field, any text can be mixed with the formatted output of variables in the operation log. For more information about display formats, refer to **Select and create custom formats** on page 136.

Up to 200 variables are permitted per operation log. The number of lines and columns are defined by the page layout in the parameter definition dialog 2.

Using the conventional windows mouse and key commands, text can be marked, cut, copied and inserted within the text field.

Check One can test whether errors have been made during text entry or dynamization.

Each dynamic entry must consist of a variable and a display format.

Variable During **Variable** a variable is selected, and its current value should be recorded in the log. Dynamic entries are shown in square brackets.

To retrospectively assign a different value to a format, position the cursor between the square brackets and press **Variable**.

Place mouse cursor in text field **> Variable** > select the required variable > **OK**

Format A variable is assigned to a display format, for example, the number of digits after decimal will be defined.

To assign later an other format to a variable, take position between the square brackets and press **Format**.

Position mouse cursor in text field > **Format** > select the required format > **OK**

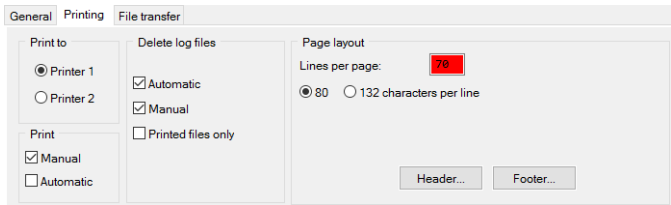
Print preview The forthcoming **Print preview** of the Operation log is displayed. Only the format specification and text are still visible in the print preview. The square brackets and the variable names are not displayed.

Variable names cannot be changed in the print preview display.

To switch back to the edit mode, press **Edit**.

Print as table ☑ The operation log is printed in tabular form. This means that the part with the dynamic area is repeated, indeed it is repeated as many times as the page layout allows.

4.4.5 Printing tab - Operation log



Print tab.png

Print to

Channel 1/2 Two printer channels are available for log output on the printer. The printer channel is selected by activating the corresponding *option* button.

Print

Manual The printing of logs can be activated **manually** by the operator at the Operator station.

Automatic Printing takes place automatically after completing the log.

Delete log files

Automatic When the **automatic** delete option is selected and the configured number of files is exceeded, the oldest log file is overwritten by the current file.

If the automatic delete option is not selected then logging is suspended as soon as the maximum number of files has been reached.

Manual The operator can select and delete individual log files.

Printed files only
Only printed log files can be deleted manually.

Page layout Defines page layout for the printout. The number of **Lines per page must** be entered and is between **10 and 100 lines**. The number of characters per line can be defined as **80 or 132 characters**, according to the paper format.

Header/Footer
The contents of the log **header** and **footer** are freely definable. They can include both static text and dynamic process variables.

There is also a collection of globally preset variables. The default is a commonly used form of the layout. See Header and footer lines in logs on page 238.

Changes in the header and footer lines generally lead to a change in size of the log. When the log is downloaded to the operator station the file size is checked. A log whose file sizes have been changed is treated as new log. All existing log files are renamed, and therefore no longer displayed in Freelance Operations. The files may be viewed using the archive browser.

4.4.6 File transfer tab – Operation log

This parameter definition dialog corresponds to the parameter definition dialog of the Signal sequence log. See File transfer tab – Signal sequence log 1 and N on page 215.

4.5 Reports

4.5.1 General description of the Excel report

Reports are used to acquire and store data in user defined Microsoft Excel templates. A report consists of several, cyclically created log files. Each log file is configured in Freelance Engineering to acquire one or more samples of a set of variables. The Freelance report function supports the storage of the acquired values in xls format. You can both configure and acquire MS Excel based reports. For each new log a new copy of the template is stored in the directory
<FreelanceData>\reports
with the configured name enlarged by a sequencing number.

4.5.2 Create a new report

You can create and edit an Excel report in the project tree below an Operator station resource or in the Common display pool (P-CD). See ***Engineering Manual System Configuration, Project tree*** for a detailed description.

> In the Project tree select an Operator station resource or the Common display pool (P-CD)

> **Edit > Insert > next level > Excel report**

Or

Right-click > **Insert > next level > Excel report**

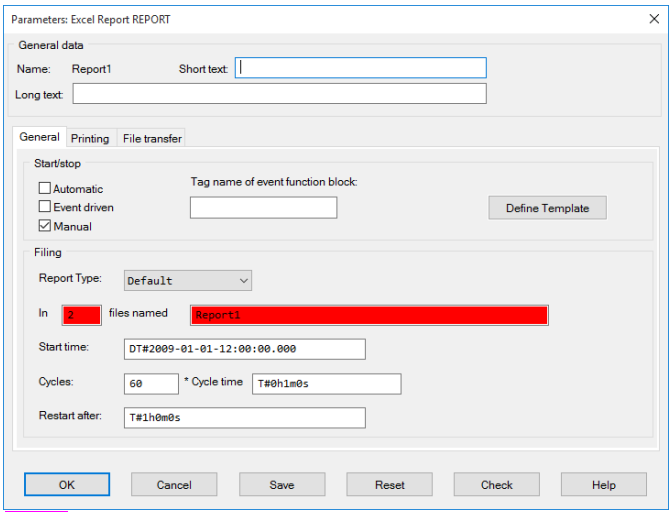
If an Excel report is configured in the Common display pool, this Excel report will be available in all Operator stations.

4.5.3 Excel report configuration

Double-click the name of the Excel report in the Project tree

The configuration of an Excel report consists of a parameter dialog with 3 tabs.

4.5.4 General data tab - Excel report



Report.png.

General data

Name The Name of an Excel report. The name has been fixed in the Project tree and **cannot** be changed here.

Short text A **Short text** can be assigned to the Excel reports. Up to 12 characters can be entered.

Long text A **Long text** can be assigned to the Excel reports. Up to 30 characters can be entered.

Start/stop

Automatic Logging is automatically started by starting Freelance Operations.

Manual The operator can start and stop logging on the Operator station.

Define template

Defines the template to be used for creation of the Excel reports.

Filing

in .. files Specifies the number of log files which are created on the operator station PC. The value must be between 1 and 400.

named	The name of the Excel report file, which is stored on operator station PC hard disk. A preset name is assigned to the report. A new name can also be specified. Example: If the name of the report is “MyReport 1”, then each file will be appended with 001, 002, 003 until reaching the number specified under *in...files*.
Start time	Date and Time value for the first possible data acquisition of this report. No values will be read before this date.
Cycles	Number of value sets in one log file, the maximum value is 32767.
Cycle time	Period of time between two acquisitions in one log.
Restart after	Period of time between two logs, must be greater than (Cycle time * Cycles). Maximum value is T#24d20h31m23s647ms (maximum for data type TIME).

Example configuration

Start time = DT#2013-06-25-08:0:00.000

Cycle time = T#1h0m0s

Cycles = 8

Restart after = T#24h0m0s

The configured **Start time** (dat and time) is added with the value of **Restart after** until current date and time is nearly reached. If the result of the next addition will be bigger than next **Start time + Cycle * Cycle time** the addition stops. The last value is used as the first start time of this log.

The first acquisition of this report is configured at June 25, 2013 at 8:00. Eight set of values will be sampled in one log file with a cycle time of one hour. This means the variables will be read at 8:00, 9:00, and so on until 15:00. The current log file will be closed, the next log file is prepared. Values will be acquired again from 8:00 the next day.

Case 1: The report is started June 25, 2013 6:30, which is earlier than the configured acquisition start.

The system will wait until the date and time configured for acquisition start is reached. The first set of values is read and stored into the template at 8:00. One cycle time later the next set of values will be read. The acquisition follows the configuration until 8 value sets are read at 15:00.

Case 2: The report is started June 25, 2013 10:30, which is during a configured acquisition cycle.

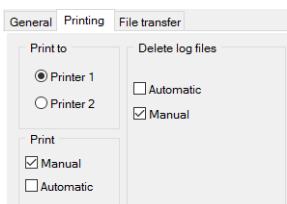
One set of values is read at once and stored into the template at 10:30. The next set of values is read at the next calculated acquisition time at 11:00, which is the fourth calculated sample time.

The remaining cycles follow the original configuration until 15:00. In this case the first log contains only six value sets. The next log will start the following day and will contain 8 sets as configured.

Case 3: The report is started June 25, 2013 18:30, which is after an acquisition time period and before the next start time.

The system will wait until the next date and time configured for acquisition start is reached. The acquisition starts the next day at 8:00. The acquisition follow original configuration of the report.

4.5.5 Printing tab - Excel reports



Report print.png

Print to

Printer 1/2 Two printer channels are available for report output on to printers. Select the printer by activating the corresponding radio button in front of it.

Print

Manual The printing of reports can be activated **manually** by the operator at the Operator station.

Automatic Printing takes place automatically after completion of logging of values in the report

Delete Log files

Automatic When the **automatic** delete option is selected and the configured number of files is exceeded, the oldest report file is overwritten by the current file, just before the *Restart after* time is about to start.

If the **automatic** delete option is not selected then Excel report logging is stopped as soon as the maximum number of files has been reached, and it gives a system message indicating that the amount of files is exceeded.

Manual By checking this option the operator can select individual report files and delete them from Freelance Operations.

4.5.6 File transfer tab – Excel reports

This tab is identical to that described under File transfer tab – Signal sequence log 1 and N on page 215.

4.5.7 Defining Excel report template

Select **General** tab > **Define template**

Clicking on the **Define template** button launches the Excel application. The functions that are used for data acquisition can be defined. A cell may contain a function or normal Excel content. Only one function is allowed per cell.

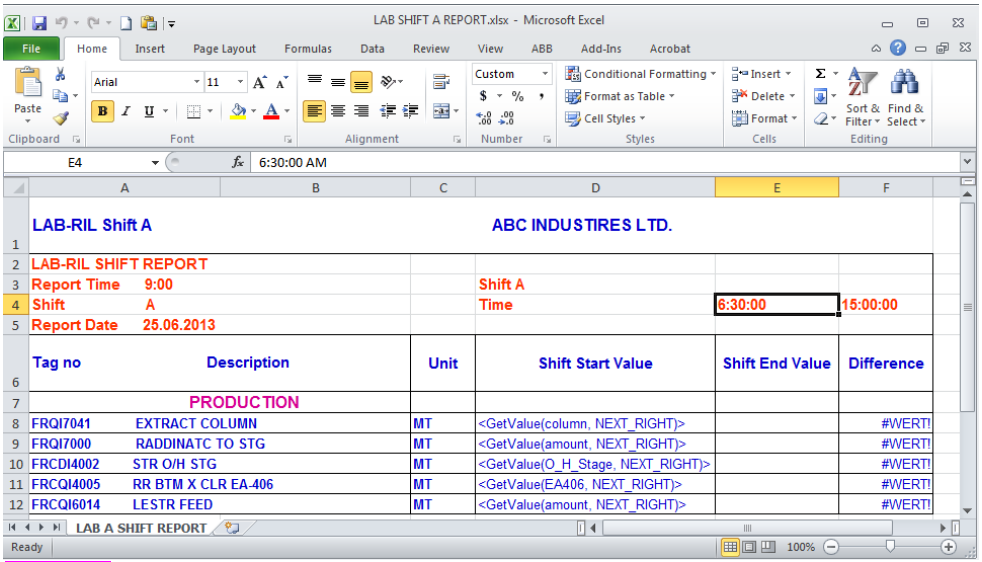
Functions are defined using the syntax <GetValue(variable, next position)>

variable Name of a variable in the variable list

next position NEXT_RIGHT, NEXT_LEFT, NEXT_DOWN or NEXT_UP. The first read value is stored in the cell with this configuration. For the following acquisition the position for the new values is calculated following the *next position* parameter.

Example: <GetValue(amount,NEXT_RIGHT)>

The following is a screen shot of a report that uses a function for data acquisition.

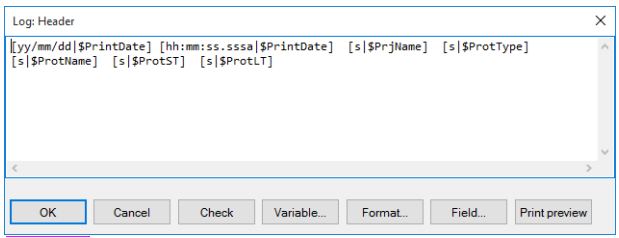


Excel_repot_us.png

After creation, the template should be saved before closing the Excel application. For detailed description on viewing reports refer to the ***Operator Manual Freelance Operations*** .

4.6 Header and footer lines in logs

In Project tree > select log > **Header** or **Footer**



Log header.png

Hint concerning variable... and format... The selection of variables is identical to the procedure for the dynamization of log text, i.e., a **variable** and its **output format** are specified [Format|VarName]. When a log file is started under Freelance Operations, the configured variables are read once, converted to the specified format and entered in header or footer line.

Variable... Selecting a process variable (from list)

Format... Selecting a display format (from list).

To assign later an other format to a variable, take position between the square brackets and push Format.

Field... Selecting a project-specific field (from list)

Print preview The print preview of the operation log is displayed. Only the format specification and text are still visible in the print preview. The square brackets and the variable names are not displayed.

Variable names cannot be changed in the print preview display.

The following elements can be incorporated in text for headers and footers:

- Static text that appears unchanged in the header and footer line on each page
- Field references, referring to the Freelance Engineering documentation function

- Variables.

Field references

Project-specific fields (expanded from the project description “into” static text during the plausibility check):

$PrjComm	Project comment
$PrjDate	Date of the project, the **format** “**dd.mm.yy**” (length: 8 characters) must be specified
$PrjMan	Manager of current project
$PrjName	Name of project (length: 8 characters)
$PrjNr	Project number
$PrjOrd	Project order
$PrjOrdNr	Order number of project
$ProtType	Log type
$ProtST	Short text of log
$ProtLT	Long text of log
$ProtName	Name of log

Dynamic fields (expanded into static text at run time of the log file):

$ProtStart	Start time of log file
$ProtStop	Stop time of log file

Dynamic fields (expanded into static text when log file is printed out):

$PgNr	Page number (maximum length: 3 characters)
$PrintDate	Time of printing, consisting of the date and time

Index

H

I

L

M

O

P

R

S

T

U

V

—

www.abb.com/freelance
www.abb.com/controlsystems

—

3BDD012518-111 A